

THE
BLACK-TAILED PRAIRIE DOG
CONSERVATION ASSESSMENT AND STRATEGY

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THE BLACK-TAILED PRAIRIE DOG CONSERVATION ASSESSMENT AND STRATEGY

William E. Van Pelt

INTRODUCTION

On July 30, 1998 the National Wildlife Federation (NWF) petitioned the U.S. Fish and Wildlife Service (Service or USFWS) to emergency list the black-tailed prairie dog (*Cynomys ludovicianus*) as threatened throughout its range. The NWF stated the emergency need was due to unregulated shooting and poisoning of prairie dogs that would occur during the Service's 12-month listing evaluation process. By law, the Service was compelled to respond to the petition within 90 calendar days.

In September 1998, the Service responded to the NWF that although it did not believe the threshold had been met for emergency listing the black-tailed prairie dog, listing the species might be warranted and they would further evaluate the petition. On March 23, 1999 a positive 90-day finding for the petition was announced (USFWS 1999). This action initiated a 9-month review process for the petition. A status review decision is expected sometime by January 2000.

Starting in November 1998, state wildlife agencies and departments of agriculture in Wyoming, Montana, and South Dakota held a series of meetings with the Service and NWF to discuss the petition and the options the states have in regard to the petition. Based on discussions at these meetings, it was determined that involvement by all states, other management agencies, and tribal interest within the historic range of the black-tailed prairie dog was warranted and a meeting should be convened to begin developing an interstate effort to conserve the species.

On March 17, 1999 the Colorado Division of Wildlife (CDOW) invited various state, federal, tribal, and other entities with an interest in black-tailed prairie dogs to a meeting to assess the feasibility of a range wide conservation agreement. Meeting participants agreed that pursuing a conservation agreement was the most reasonable approach for black-tailed prairie dog conservation. They believed that if strong partnerships could be developed under this approach, it would be a significant step forward in bringing local governments, private landowners, and nongovernmental organizations directly into black-tailed prairie dog management.

The purpose of this Conservation Agreement is to manage, maintain, and enhance habitat and populations of black-tailed prairie dogs across its historic range and reduce the number of threats impacting their viability through the cooperation of private, tribal, federal, and state landowners. The Conservation Agreement has many elements that provide actions, opportunities, and incentives for interested parties to become involved with conservation. By implementing management actions such as eliminating mandatory control, regulating seasons or possession limits, maintaining and conserving their habitat and ecosystem needs, and establishing core populations on public lands to provide animals for dispersal to uninhabited areas or individuals for recolonization, the cooperators of this conservation agreement contribute greatly toward the conservation of the species.

The Conservation Agreement embraces two main components. The first is a Conservation Assessment, which describes the current status of the black-tailed prairie dog in the United States, Mexico, and Canada and identifies the threats limiting its conservation. The second component, the

Conservation Strategy focuses on reducing or eliminating threats limiting black-tailed prairie dog viability, as defined in the conservation assessment, and thus contributes to its conservation when implemented.

CONSERVATION ASSESSMENT

The following subsections provide life history, status, and management information on the black-tailed prairie dog.

DESCRIPTION

The black-tailed prairie dog is a diurnal, burrowing rodent, almost 15 inches in length, including a 2½-inch, black-tipped tail. It is yellowish buff in color and weighs up to three pounds. Albinism and melanism occur in black-tailed prairie dogs but are considered rare. Historically, the black-tailed prairie dog ranged from Canada to Mexico throughout the Great Plains states and west to southeastern Arizona (Foster and Hygnstrom 1990), but the species is now considered uncommon or extirpated in many areas of its former range (Hoogland 1996).

LIFE HISTORY

Black-tailed prairie dogs are highly social animals. They live in colonies or towns, which cover from one acre to thousands of acres of grassland habitat. A family group, or coterie, is made up of an adult male, one to four breeding females and their offspring younger than two years of age. With the emergence of young, coterie can number as many as 40 individuals (Hoogland 1996). Black-tailed prairie dogs are active all year long, but during extremely cold weather will remain underground for several consecutive days.

Black-tailed prairie dogs become sexually mature in the second February or March following birth (Hoogland 1996). Breeding season varies with latitude, starting in January in the southern parts of its range and continuing into April in the northern part (Hoogland 1996). They normally have one litter per year and sizes range from one to eight young. However, due to mortalities, on the average, only three individuals survive and come above ground. Pups emerge at about 41 days and will stay with their natal coterie for a minimum of two years (Hoogland 1996). Prairie dogs have been documented to live up to eight years in the wild (Foster and Hygnstrom 1990).

Black-tailed prairie dogs are herbivores and feed on a variety of vegetation including grasses and forbs (Koford 1958), and to a lesser extent seeds and insects (Foster and Hygnstrom 1990). Short-grass species commonly eaten by prairie dogs include buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*). It has been estimated that it takes 256 prairie dogs to eat as much as one cow eats in one month (Koford 1958). Grasses and other vegetation are clipped close to the ground to allow for a greater range of sight. The digging actions of prairie dogs contribute to enhancing soil structure, water filtration, and forb growth.

Ungulate species seek out and take advantage of the highly nutritional vegetation created by prairie

dogs continuously clipping it (Foster and Hygnstrom 1990). Besides attracting ungulates, prairie dogs and their colonies also are used by a wide variety of wildlife species. A number of species prey on prairie dogs, and in the case of the black-footed ferret, have become very specialized in killing this communal rodent (Koford 1958). Because the black-tailed prairie dog influences ecosystem functions through its activities in unique and significant ways, it is considered by some as a keystone species of the prairie grasslands (USFWS 1999).

However, the same activities some consider as a necessity to the grassland ecosystem, others consider them as a nuisance. In a study by Conover and Decker (1991), prairie dogs, and their activities were identified by some as causing the worst damage by any wildlife species in their state and contribute hundreds of thousands of dollars worth of damage to agriculture crops, earthen dams, airports, and golf courses annually. In addition to damages, prairie dog species can be a health hazard. Cases of human death due to plague contracted from handling Gunnison's prairie dog have been documented in Arizona (ADHS 1993).

TAXONOMY

Taxonomists recognize two subspecies of black-tailed prairie dogs: *Cynomys ludovicianus ludovicianus* and *C. l. arizonensis* (Hall 1981). Black-tailed prairie dogs that occurred in Arizona, southern New Mexico, western Texas and northern Mexico are typically considered Arizona black-tailed prairie dogs, while others elsewhere are considered plains black-tailed prairie dogs. These two subspecies have been the subject of several investigations including those of Hollister (1916), Pizzimenti (1975), Hansen (1977), and Chesser (1981). Regardless of conclusions made during these and other investigations, it is generally recognized that *arizonensis* is only slightly differentiated from the nominant form *ludovicianus*. For purposes of nomenclatural convenience, regarding this species as monotypic may be adequate. However, from the standpoint of evolution, the uniqueness of populations throughout their range must be given serious consideration. This Conservation Agreement covers all black-tailed prairie dogs.

DISTRIBUTION

Early accounts about prairie dogs, although anecdotal at times, indicate they occurred in large numbers. Naturalist Ernest Thompson Seton estimated that five billion black-tailed prairie dogs inhabited the North America prairies in the early 1900s (Seton 1953). However, since that time prairie dog numbers and distribution have been greatly reduced across their range. This reduction resulted from a number of factors including intensive control programs, conversion of habitat to croplands, disease epizootic, and urbanization. The historic and current distributions of black tailed prairie dogs throughout their range are as follows:

Arizona-In the 1800s, black-tailed prairie dogs were considered quite abundant throughout their range in southeastern Arizona. In 1907, Mearns (cited in Hoffmeister 1986) reported that "For miles the burrows of these animals are thickly scattered over the plains south of the Pinaleno range or Sierra Bonito, where the soil is clayey and better suited to the habits of this animal than the loose sand of most of Arizona." Black-tails ranged from the Sulphur Springs Valley north of Bonito, south

to the Mexican border, and west to the Sonoita grasslands, on the west side of the Huachuca Mountains. Although Alexander (1932) considered black-tailed prairie dogs extirpated by 1932, Charles Vorhies collected two animals six miles southeast of Fort Huachuca in 1938 (Hoffmeister 1986). In 1962, in a memorandum to the Bureau of Sports Fisheries and Wildlife Regional Director, Everett M. Mercer documents the persistence of a small black-tailed prairie dog colony near Apache, Arizona until 1959-1960. Cockrum (1960) considered black-tailed prairie dogs extirpated from Arizona in 1960 and the species is still considered extirpated by the Arizona Game and Fish Department (AGFD)(AGFD 1988).

Colorado-In the 1800s, black-tailed prairie dog towns covered large portions of the eastern 1/3 of Colorado. Cary (1911) stated "[t]here is probably not a county east of the foothills in which it is not present in considerable numbers, and colonies are found in some of the broader foothill valleys to an elevation of 6,000 feet." Lechleitner (1969) cites Hollister (1916) as a source that indicated "...this species was very abundant on the plains of Colorado and often occurred in towns covering several square miles." However, no early estimates on the acreage inhabited by prairie dogs are available for Colorado.

Historical estimates suggest that 20 percent of the short- and mid- grass prairies may once have been inhabited by prairie dogs (Laurenroth 1979). If it is assumed lands used for dry-land and irrigated crops within the black-tailed prairie dog range were once suitable habitat, and that a 20% occupation rate is reasonable, then historically, black-tailed prairie dogs occupied approximately 4.6 million acres in Colorado.

Colorado has no current statewide, scientifically based estimate of habitat occupied by black-tailed prairie dogs. Prior to 1979, most reports of prairie dogs in Colorado were anecdotal in nature. A 1978 and 1979 survey of 12 counties in eastern Colorado mapped 24,600 acres of black-tailed prairie dog towns (Bissell et al. 1979). The counties surveyed represent approximately 48% of the land area of the counties in eastern Colorado within the species range. This survey did not include the rapidly developing counties along Colorado's Front Range, where as much as 39,000 acres were occupied by prairie dogs. Extrapolating the acreage yields an estimate of approximately 50,800 acres, and with the addition of 39,000 acres of prairie dog towns along the Front Range yields a total estimate of approximately 89,000 acres occupied by black-tailed prairie dogs in eastern Colorado at that time. In contrast, Colorado Agricultural Statistics Service estimated approximately 1,553,000 acres being occupied by prairie dogs in Colorado. However, this survey included all prairie dog species, and landowners were asked to estimate occupied acreage. However, due to prairie dog species distribution the Colorado Department of Agriculture interprets the results to over 930,000 of the acres identified in the survey were black-tailed prairie dogs. In 1998, Knowles (1998) estimated 44,000 acres were occupied in areas outside agricultural and private lands in eastern Colorado.

Regardless of the lack of complete information, it is clear the black-tailed prairie dog in Colorado has undergone a substantial reduction in population size (number and size of towns) since the early 1900s; however, they are still abundant in many localities (Fitzgerald et al. 1994). Limited acres of small, scattered black-tailed prairie dogs colonies exist on parcels of public lands administered by the Bureau of Land Management (BLM) in eastern Colorado. Few colonies exceeded 49 acres

(Lechleitner 1969), with a mean colony size of 43 acres (Bissell et al. 1979).

Kansas-The first description of the prairie dog in Kansas occurred in 1806-07 by Pike and he designated it by its Indian name, Wishtonwish. The historic range of the prairie dog was the western two-thirds of Kansas, west of the tall grass prairie of the Flint Hills. In 1859, J.R. Mead (1899) indicated that prairie dogs were innumerable and the divide between the Saline and Solomon rivers in Ellsworth County (north central Kansas) and west was a continuous dog town for miles. Lantz (1903) reported that 68 counties in Kansas were occupied with prairie dogs totaling about 1,250,000 acres and estimated a statewide population of 2,000,000 acres.

The decline of the black-tailed prairie dog was primarily due to poisoning efforts (Smith 1958) and changes in land use practices after settlement in western Kansas. Nearly two-thirds of the 33 million acres of range and pasture land within the geographic range of the prairie dog in Kansas were converted to cropland and other uses after settlement. Because prairie dogs prefer deep, relatively level soils, much of this agricultural development probably occurred in areas inhabited by prairie dogs, with resultant destruction or fragmentation of many of the larger colonies (Choate et al. 1982). Furthermore, legislative action directed at extermination of prairie dogs in Kansas was initiated in 1901 (Lantz 1903).

Numerous methods have been used to collect population information on prairie dogs in Kansas. Methods include questionnaires to landowners, on-the-ground surveys by Natural Resource Conservation Services and Kansas Department of Wildlife and Parks (KDWP) personnel, and counting towns from aerial photos. In 1956, Smith (1958) indicated a total of 57,045 acres of prairie dog towns remaining in Kansas, about one-thirtieth of the number reported by Lantz in 1903. Henderson and Little (1973) indicated approximately 35,881 acres of prairie dog towns. In 1977 and 1988, the KDWP conducted a ground count survey of prairie dog towns (unpublished data) evaluating acreage of prairie dogs at 57,407 and 24,094 respectively. Finally, Vanderhoof and Robel (1994) reported 46,542 acres of prairie dogs in 1990-1992.

Recent studies have documented drastic prairie dog declines in areas of Kansas. Lee and Henderson (1989) compared their 1986 data with 1902 data (Lantz 1903) on eight Kansas counties and found an 86% decline in prairie dog occupied area. Powell (1992) found an 84% decline in prairie dog area from 1902 (Lantz 1903) to 1990 for eight Kansas counties and a 17% decline from 1986 (Lee and Henderson 1988) to 1990 for three Kansas Counties.

Montana-Although the original abundance of prairie dogs in Montana is unknown, early accounts indicate they were abundant and widely distributed east of the Continental Divide (FaunaWest 1999). Lewis and Clark reported prairie dog colonies along the Missouri River were common and some were three to seven miles long (FaunaWest 1999). There are anecdotal accounts of prairie dog towns stretching from the Little Rocky Mountains to the Larb Hills (FaunaWest 1999). Flath and Clark (1986) estimated prairie dog acreage in southeastern Montana at 117,492 acres based on railroad survey notes recorded from 1908-1914.

Prairie dogs were intensely controlled with toxicants in Montana starting at the time of settlement.

Control efforts peaked during the 1920s and 30s resulting in a substantial decline in prairie dogs. For example, over 172,000 acres were poisoned in Phillips County during this period. Declines in prairie dog numbers continued until 1972 when the use of Compound 1080 was banned on Federal lands. Plague and conversion of habitat to agricultural use continue to impact prairie dogs in Montana.

The first attempt to estimate prairie dog acreage occurred in the late 1980s. Campbell (1989) estimated over 100,000 acres located in about 1,000 colonies east of the 110 meridian. However, much of the information was not based on actual field surveys and the degrees of certainty for this estimate is low (FaunaWest 1999). In 1995, Knowles and Knowles updated the Campbell information and estimated 80,000 acres. FaunaWest (1999) estimated 1,353 colonies covering 66,139 acres. Colony size average was 49 acres.

Nebraska-Historically, black-tailed prairie dogs were found throughout most of Nebraska, nearly to the Missouri River on the eastern edge of the state (Jones 1964). Colonies in the early 1900's were noted as far east as Cuming and Washington counties (Jones 1964). Merriam (1901) suggested that prairie dogs might have increased with the arrival of white settlers on the plains, due to an increase in the food supply through cultivation and by reducing the natural enemies of prairie dogs.

Prairie dogs were once found through a large portion of the tall-grass prairie in Nebraska, in habitat made suitable by the grazing of vast herds of bison (Jones 1964). At present, prairie dogs occur in short and mid-grass prairies of the panhandle, Sandhill region, and southwestern Nebraska. Prairie dog occurrence in the Sandhills of north central Nebraska is limited primarily to river valleys and other areas where the substrate will support the burrow systems.

Black-tailed prairie dog numbers in Nebraska have undoubtedly declined substantially from historic levels. Most of the decline occurred in the early 1900s with the conversion of grassland to crops and poisoning campaigns. Although numbers declined substantially in the early 1900s, surveys conducted in Nebraska since the 1970s have shown populations to be fairly stable in recent years.

In 1975 and 1976, Nebraska Game and Parks Commission (NGPC) reviewed the status and distribution of black-tailed prairie dogs through analysis of aerial photographs for 52 of Nebraska's 93 counties that were known to contain most of the prairie dogs in the state. Although the scale of some of the photos was small, resulting in problems with colony identification, the survey has served as a baseline for subsequent surveys. This initial survey showed 2,018 prairie dog colonies totaling 41,197 acres. Twenty-one counties surveyed in 1975-76 were surveyed again in 1982, using larger scale aerial photos. These counties contained 1,395 prairie dog colonies totaling 29,066 acres in the 1975-76 survey while they showed 1,604 colonies totaling 46,245 acres in the 1982 survey. The mean photograph date for these counties in the 1975-76 survey was 1965, while the mean date for the 1982 survey was 1975. Seven of the counties that were surveyed in 1975-76 and again in 1982 were surveyed again in 1997, using 1993 photographs. These seven counties showed 563 colonies totaling 12,554 acres on the 1975-76 survey, 697 colonies totaling 21,265 acres on the 1982 survey and 484 colonies totaling 18,723 acres on the 1997 survey.

Using information from the surveys conducted since 1975, an estimate was made for the total statewide prairie dog acreage in Nebraska. Using photographs from the early 1980's, prairie dog

acreage in Nebraska was estimated at about 80,000 acres.

In general, the NGPC feels prairie dog numbers appear to be fairly stable in recent years for the state. Recreational shooting is thought to have little impact on overall numbers. Plague has been documented in the state, but only in a few areas. Impact by plague on the statewide prairie dog population is unknown but thought to be insignificant. Of all the human control activities in Nebraska poisoning is thought to have the most impact on the statewide prairie dog population at the present time. Prairie dogs occur primarily on private land in Nebraska, and landowners appear to be quite interested in prairie dog control. Control activities are implemented by landowners directly, by private pest control agents or with the assistance of U.S. Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services (APHIS-WS), which is active in counties that provide partial funding.

New Mexico-The first detailed accounts of prairie dogs in the state began around the mid 1850s. C. B. Kennerly (Baird 1859) observed prairie dogs near the San Luis Mountains in what is now Hidalgo County (Hubbard and Schmitt 1984). Proof that Kennerly observed prairie dogs is verified by a specimen taken at San Luis Spring, Hidalgo County by J. H. Clarke in May 1855 (Baird 1859). Bailey (1932) described the distribution of black-tailed prairie dogs as, although irregularly distributed, "they may be said to occupy practically all of it" in the area east of the Pecos River Valley and the Sangre de Cristo Mountains. Bailey (1932) further described prairie dogs as occurring over southern New Mexico, west of the Pecos Valley. Bailey reported that in 1899 at the Pecos River Valley they were "abundant at frequent intervals" from Portales to Roswell, south to Carlsbad and the Texas border, and from Roswell west to the Capitan Mountains "in numerous and extensive colonies." Bailey (1932) also mentioned the presence of black-tailed prairie dogs in southwestern New Mexico northward to Cliff and Silver City in Grant County during 1892-1908 and Lake Valley in Sierra County in 1909.

There is no evidence of black-tailed prairie dogs in Luna County (Findley et al. 1975) or in adjacent northern Chihuahua (Anderson 1972). Mearns (1907) crossed the area from El Paso to Hidalgo County and indicated that after leaving El Paso, the first prairie dogs encountered were at Dog Spring in southern Hidalgo County near where the species was noted by Kennerly. Hubbard and Schmitt (1984) concluded that black-tailed prairie dogs were absent between El Paso and the eastern portion of southern Hidalgo County. Perhaps colonies of black-tailed prairie dogs in Hidalgo County were connected eastward through Grant, northern Luna, Sierra, and Doña Ana counties to populations in the Tularosa Basin and beyond (Hubbard and Schmitt 1984). This assumption is verified in Bailey's (1932) description of black-tailed prairie dogs in the Animas Valley in 1908 as "an almost continuous prairie dog town for its whole length and breadth." Bailey estimated that as many as 6,400,000 prairie dogs occupied 1,000 square miles in that part of southwestern New Mexico.

Nonetheless, the range of this species in New Mexico has been significantly reduced since the mid 1800s (Hubbard and Schmitt 1984). In contrast to Bailey's 1908 observations, Alexander (1932) reported seeing prairie dogs totaling only about 50 acres in the Animas Valley and she had heard of only one other colony in the Playas Valley. By 1955, black-tailed prairie dogs were scarce south of

the Mogollon Plateau (Findley et al. 1975). Small numbers of prairie dogs persisted into the late 1950s and early 1960s in the Summit area of Hidalgo County and the Separ to White Signal areas of Grant County (A. Bayne et al. pers. comm. in Hubbard and Schmitt 1984). These few known populations were soon thereafter extirpated, with no populations of black-tailed prairie dogs existing in New Mexico west of the Rio Grande.

In 1984, Hubbard and Schmitt reported that the estimated overall range of the black-tailed prairie dog in New Mexico had been reduced by 25% by 1981. Bodenchuk (1981) estimated acreage of prairie dogs per county using questionnaires mailed to agricultural producers statewide. Based on this statewide survey, Bodenchuk reported a total of 500,000 acres of prairie dog colonies in the state, of which black-tailed prairie dogs comprised 27.5%. Using Bodenchuk's estimate, there were an estimated 137,500 acres of remaining black-tailed prairie dog colonies in New Mexico in 1981. These data revealed prairie dogs were not present in Hidalgo, Grant, Luna, Doña Ana, Sierra, Otero, Lincoln, Eddy, and Union counties. Absence of records of prairie dogs reported by Bodenchuk (1981) for Hidalgo, Grant, Luna, and Doña Ana Counties are consistent with conclusions made by Findley et al. (1975) and Hubbard and Schmitt (1984). However, the absence of records of prairie dogs in Sierra County may reflect a failure in his survey to reach all agricultural producers because Gunnison's prairie dogs (*C. gunnisoni*) are known to occur. The absence of reports from Union County may be explained by the same reasons because black-tailed prairie dogs are rather widespread inhabitants of Union County (Hubbard and Schmitt 1983) and their presence was recently reconfirmed in 1996 (Sager 1996). The examples of no reports of prairie dogs for Lincoln and Otero counties and inclusion of these counties in the area of probable extirpation by Findley et al. (1975) were premature. Black-tailed prairie dogs are known to occur in each of these counties (e.g., Hansen 1977; Hubbard and Schmitt 1984).

Additional investigations on black-tailed prairie dogs, including surveys in Colfax, Union, Harding, and Mora Counties (covering about 11,500 square miles), were conducted in 1996 (Sager). These surveys revealed the presence of a total of 1,191 black-tailed prairie dog individuals in over 41 colonies in Union County, 11 colonies in Colfax County, two colonies in Mora County, and 10 colonies in Harding County. Similar surveys were conducted in 1997 by Paternoster, revealing the presence of 33 colonies of black-tailed prairie dogs in Roosevelt County and 40 colonies in Curry County together totaling about 3,174 occupied acres. Although these two surveys revealed a total of 137 colonies of black-tailed prairie dogs in six counties, current systematic surveys such as these are lacking in the remaining counties of New Mexico.

Although efforts to control prairie dogs continue in New Mexico, the New Mexico Department of Game and Fish (NMDGF) believes these control activities are now more localized in application and on a smaller scale than in the recent past. Control of prairie dogs is still done for the purpose of protecting grazing lands, agricultural crops, and farming developments. Other control activities, usually in close proximity to human developments, include eradication or control of prairie dogs for their presumed role in transmission of sylvatic plague to humans. Management of black-tailed prairie dogs has not been limited to control. Black-tailed prairie dogs have recently been reintroduced in two areas in Sierra County, and two areas in Hidalgo County are being discussed for possible reintroduction in areas of private ownership on the Gray Ranch.

Given some gaps in current information concerning their distribution, numbers, viability of isolated populations, impacts of habitat fragmentation, amount and extent of efforts to control (or eradicate) them, population impacts from plague, and other biological factors, the overall status of black-tailed prairie dogs in New Mexico needs further verification. However, there are no data available that would suggest populations in New Mexico are stable and/or improving.

North Dakota-The black-tailed prairie dog range extended across the southwestern portion of the state and occupied an estimated two million acres. Settlers viewed prairie dogs as vermin and there were extensive efforts to exterminate or substantially reduce their numbers. These efforts were initiated in the 1920s by various entities, and between 1920 and 1961, occupied prairie dog habitat was reduced by more than 99 percent. In 1961, the Bureau of Sport Fisheries and Wildlife estimated 19,750 acres of occupied habitat in North Dakota. Bishop and Culbertson (1976) also documented historical declines of prairie dogs in North Dakota. They examined aerial photographs of western North Dakota from 1939-1972 to evaluate the impact of control programs and land use practices on prairie dogs within the Little Missouri National Grassland. Results showed an 89% reduction in the number of towns. The Regional Environmental Assessment Program (REAP) conducted a census from 1975-1978 covering all areas of North Dakota with active prairie dog towns. Results indicated 9,231 acres of active prairie dog towns, and a tentative conclusion was that prairie dogs were increasing during this time period.

The most recent survey of prairie dogs in North Dakota was conducted in the late 1980s. Results showed approximately 20,000 acres of prairie dog towns, which is roughly double the acres found by the REAP report and supports their conclusion on increasing numbers. Approximately half of the acreage is on private land while the other half is on state, federal, or tribal land. Although there have been no additional surveys since the late 1980s, the prairie dog population appears to have remained fairly stable based on anecdotal information and observations from various natural resource agencies. A current survey for occupied habitat by the U.S. Geological Survey (USGS) Northern Prairie Wildlife Research Center estimates population levels at about 30,000 acres.

Oklahoma-In the 1800s, black-tailed prairie dogs covered a vast portion of Oklahoma. It has been reported that millions of acres were present at that time within the state (Lewis and Hassien 1974). Shackford (1989) cites an 1898 colony near Fort Reno in Canadian County that stretched northward for 22 miles. Prior to 1967, however, most reports of prairie dogs in Oklahoma were anecdotal in nature. Because of a lack of data the degree to which black-tailed prairie dog numbers have been reduced since pre-settlement times cannot be accurately determined.

It is generally accepted that the black-tailed prairie dog in Oklahoma has undergone a reduction in population size (number and size of towns) over the past 150 years. However, the geographic limits of the species within the state have remained unchanged from historical records. Much of the decline in prairie dogs numbers in Oklahoma probably occurred during the early 1900s. This decline in numbers was a direct result of control programs. Though extremely diminished in numbers compared to the mid 1800s, the black-tailed prairie dog has been able to survive on smaller patches

of habitat widely scattered over the western part of the state (Shackford 1989).

In 1967, Tyler (1968) made an extensive survey of prairie dogs and associated species throughout the state. Tyler (1968) found 280 active black-tailed prairie dog towns in 34 counties, totaling 9,522 acres and 34,452 prairie dogs. Of this acreage, 42% occurred in the three panhandle counties: Cimarron, Texas, and Beaver (Tyler 1968). Lewis and Hassien (1974) noted an increase to 15,000 acres seven years later. In 1988, Shackford (1989) conducted a second comprehensive prairie dog survey and discovered 399 towns within 33 counties, incorporating 18,382 acres and 66,656 prairie dogs. Total acreage and number of towns increased in the three panhandle counties to 242 (61%) towns, covering 14,479 (79%) acres in 1989.

During 1998 and 1999, the Oklahoma Department of Wildlife Conservation (ODWC) verified the presence or absence of 315 (78%) of the 1989 towns statewide. Of these 313 towns, 192 (61%) are still in existence today. Additionally, 111 new towns were identified while verifying the 1989 town status, totaling 303 towns documented. ODWC considers the 111 new towns to be a conservative number, since they did not systematically survey the state for new prairie dog towns. Other new towns may be present but were not detected because ODWC concentrated on examining the 1989 survey data. Without conducting a systematic survey, however, the 24 counties for which they have current data show a net loss of only nine towns, representing a 3.81% change in the number of towns throughout the prairie dog's range in Oklahoma. Full verification within ten counties remains to be completed.

The greatest loss of prairie dog towns since 1989 occurred in Cimarron County, in the western 1/3 of the panhandle, where the majority of these losses were the result of plague (confirmed outbreak 1991; suspected outbreak 1994). In the panhandle region, ODWC verified the presence/absence of 193 (80%) of the 242 towns surveyed in 1989. Of these 193 towns, 109 (56%) still exist nearly 10 years later. Eighty new towns were observed, resulting in 189 confirmed prairie dog towns in the panhandle. This represents a net loss of only four towns or -2.07% change in prairie dog towns in the Oklahoma panhandle.

In a letter to Jamie Clark, USFWS Director, Mark Lomolino, Oklahoma Biological Survey, cautioned looking at only town numbers. Although the number of towns may not or may decrease, town size (occupied area) and prairie dog numbers may decrease at greater rates. For example, in Cimarron, County the mean town size decreased from 84 acres to 25 acres. Contributing to a lower average is the loss of a town greater than 600 acres.

South Dakota- Presettlement estimates of South Dakota's prairie dog acreage are anecdotal, as are many such wildlife population estimates. In 1923, it was estimated approximately 1,756,720 acres of occupied black-tailed prairie dog habitat existed in South Dakota, following the initiation of control efforts in 1918. Estimates for prairie dogs in the 1960s ranged from 33,000 acres to 60,000 acres in 1968. Hansen (1988) reported statewide acreage for 1968 as 61,000 acres. Tschetter (1988) reported results of a prairie dog survey questionnaire, estimating 184,000 acres in 1987, with more than 75% of this acreage on tribal lands. In 1996, South Dakota Department of Game, Fish and Parks (SDGFP) completed a similar survey questionnaire, resulting in a statewide prairie dog acreage

estimate of 264,000 acres (SDGFP 1996), with 58% reported on tribal lands, 43% on private lands, 9% on federal lands, and 4% on state lands. A recent report, based on a interview with a state agency representative, estimates 244,520 acres of occupied habitat in South Dakota, which is 36% of the habitat in the United States (Knowles 1998).

No comprehensive statewide prairie dog acreage survey has been conducted in South Dakota. Recent statewide estimates are based on questionnaires of land management agency representatives, with varying levels of ground-truthing associated with the estimates. However, the Cheyenne River Sioux Tribe and several federal land management agencies, such as Wind Cave and Badlands National Parks and Nebraska National Forest, have implemented prairie dog acreage monitoring programs (USDA-Forest Service 1988).

Texas-Field notes from early explorers, museum specimens, and turn-of-the-century accounts in the literature provide the information upon which the historical range of the black-tailed prairie dog in Texas is based. While these accounts provide useful information about the original distribution and abundance of the species, it does not allow for scientifically accurate estimates of pre-settlement population densities or the total number of acres inhabited. Nonetheless, there has been an overall, dramatic decrease in the total number of prairie dogs and occupied habitat in Texas. This decrease is primarily due to conversion of grasslands to agriculture but disease and poisoning have also contributed to the losses. However, the geographic limits of the species within the State have remained practically unchanged from the earliest recorded accounts.

Bailey (1905) described the range of the prairie dog in Texas as extending from Henrietta, Fort Belknap, Baird, and Mason west to near the Rio Grande River, north through the Panhandle and south to Devil's River, to 10 miles south of Marathon and 25 miles south of Marfa. This equates to approximately the northwest 1/2 of the state and includes all or portions of the High and Rolling Plains, Edwards Plateau, and the Trans Pecos Ecological Regions. Bailey estimated 800,000,000 prairie dogs covering an area of 90,000 square miles (57,600,000 acres). Although these historical numbers are the most reliable estimates for Texas, caution should be exercised in using these numbers because they were based on rough estimations and extrapolations.

Only two modern studies have been conducted to determine the status of black-tailed prairie dogs in Texas, and only one included the entire historical range. In Cheateam's study (1977), aerial photographs of 108 central and western Texas counties were studied to determine size and distribution of prairie dog towns. Ninety-nine of the 108 counties were within the historical distribution described by Bailey (1905). Cheateam (1977) found 1,336 colonies covering 90,023 acres in 89 counties. He estimated the average colony size at 67.38 acres.

The second and most recent attempt to determine black-tailed prairie dog status in Texas was made by Lair and Mecham (1991) in an effort to evaluate and identify potential black-footed ferret reintroduction areas. They examined aerial photos (dated from 1978 to 1985) from 29 counties in the panhandle to determine the existence, distribution, and status of prairie dog towns greater than 100 acres. These particular counties were selected because Cheateam's work indicated that they had the highest density of prairie dogs. Prairie dog towns in those counties were mapped and town sizes

were measured using a compensating polar planimeter. The map work was supplemented by the use of ASCS crop slides for eight counties (a subset of the 29) taken during the spring of 1990. In total, they recorded more than 800 prairie dog towns in the 29 counties and 298 towns in 22 counties were larger than 100 acres, with the largest being 2,200 acres. The total coverage was 67,907 acres, with an average of 228 acres. They noted that many towns of less than 100 acres existed in close proximity to one another and probably acted as a complex, but these were not considered in their total. In addition, several large towns were located by casual ground surveys in 1990, but were not documented in their study because they were not on the older photographs, nor included in the area covered by the crop slides.

Without reliable baseline or current information regarding distribution and status, it is impossible to accurately determine declines in population density or distribution. Although they have been compared to show evidence of declines, use of the results from the Cheateam (1977) and Lair and Mecham (1991) studies for this purpose do not provide useful data on population trends because the studies do not cover the same number of counties nor do they use the same criteria for assessing population status. Cheateam's 1977 total of 90,023 acres included all prairie dog towns in 89 counties, whereas Lair and Mecham's 1991 total of 67,907 acres included towns in only a portion of 29 counties, and towns of less than 100 acres were not considered. Cheateam's results are an estimated total from the mid 1970s, whereas Lair and Mecham's results estimate a minimum number of acres of prairie dogs known from 1978 to 1990.

Wyoming-The historical range of the black-tailed prairie dog includes approximately the eastern third of the state and was contiguous with the range of the species on the Great Plains. Elevation (approximately 5,500 feet) and vegetation define the western edge of the range. The habitat changes from Great Plains to the Intermountain West. The western range boundary follows a line from the Wyoming-Montana state line along the east slope of the Bighorn Mountain Range, then southeast along the east slope of the Laramie Mountains to the Wyoming-Colorado state line.

The black-tailed prairie dog has undergone severe reduction in occupied range and population in Wyoming since settlement and the advent of farming and ranching. Occupied range has been reduced by over 80% from pre-settlement (Campbell and Clark 1981). Similar to other parts of the historical range, the major reduction in prairie dog populations probably occurred in the early 1900s when poisoning programs began in earnest.

The Wyoming Game and Fish Department (WGFD) conducted prairie dog colony mapping between 1982 and 1987 to identify potential black-footed ferret populations and/or reintroduction sites. Mapping was concentrated in the primary range of the species in Wyoming. Small, scattered colonies were thought to occur in the Bighorn Basin but were not mapped.

In 1987, estimates indicated that within the primary range 73 townships supported between 1,000 and 2,000 acres of prairie dog colonies, and 29 townships supported over 2,000 acres of prairie dog colonies. The data indicated a minimum of 131,000 acres and a maximum of 204,000 acres. In 1998, the Wyoming Department of Agriculture (WDOA) estimated 362,284 acres of occupied black-tailed prairie dog habitat in their Weed and Pest Districts and Conservation Districts (pers. comm. Reichenbach 1999).

Conversion of native rangeland to cropland is occurring at a very negligible rate in eastern Wyoming. Poisoning of black-tailed prairie dogs continues, and estimates indicate that acreage remaining decreases a few percent annually in localized areas. Data have not been collected in such a way that annual or long-term increases or decreases by colony, complex or county could be monitored. The five-year Objective in the WGFN Nongame Bird and Mammal Plan is to maintain black-tailed prairie dog distribution in a minimum of 102 townships, and all counties, within the range and at a level of 167,500 acres.

Canada-Historically, it is estimated that there were 1,500-2,000 acres of black-tailed prairie dog occupied habitat in Canada (Knowles 1998). Currently, the species is found in a small area along the Frenchman River Valley in extreme southern Saskatchewan. Many of these colonies are in Canada's Grasslands National Park. Millson (1976) mapped 15 colonies in this area totaling 1,242 acres (503 hectares) in 1970; and in 1975, 16 colonies were mapped totaling 1,885 acres (763 hectares). Laing (1986) later mapped 14 colonies totaling 1,691 acres (684.5 hectares). Surveys conducted between 1993 and 1996 found 25 colonies totaling 2,318 acres (938 hectares), with 13 colonies totaling 1,353 acres (548 hectares) located within current park holdings (USFWS 1999). Colonies ranged from 3.9 acres (1.57 hectares) to 328 acres (132.9 hectares).

Mexico-Historically, black-tailed prairie dog occupied habitat in Mexico was estimated at 1,384,000 acres (Mearns 1907 and others in Ceballos et al. 1993). However, two studies have documented historic and recent declines. Ceballos et al. (1993) mapped 136,000 acres of occupied habitat in Chihuahua, Mexico, in 1988. Included in this estimate was one colony within the Janos-Nuevo Casas Grandes Complex, which totaled 86,450 acres. List (1997) reported the total amount of occupied habitat as 90,000 acres in 1996. Colony fragmentation had occurred in prairie dog colonies previously surveyed, reducing the size of towns and increasing their isolation. The average town size decreased from 6,320 acres in 1988 to 417 acres in 1996. List indicated that reduction was due to increased agricultural conversion, poisoning, and drought.

MANAGEMENT STATUS

The black-tailed prairie dog's management status varies across its range. During the 1980s and early 1990s, the Service maintained a three tiered list of species (and subspecies) that were considered "candidates" for federal listing as threatened or endangered, pending more information on status, threats, and other factors relevant to listing determinations under the federal Endangered Species Act of 1973, as amended. The Arizona black-tailed prairie dog was added to the C-2 list in 1985, because of its presumed range-wide extirpation from Arizona and reductions in numbers in Texas and New Mexico. The Service discontinued the use of the three categories on the candidate list in 1996 and maintains a list of candidates where listing may be warrant listing, but is precluded by other higher priority listing actions. In addition, the U.S. Forest Service (USFS) and BLM maintain lists that identify the black-tailed prairie dog as a sensitive species.

The current state management or legal status for black-tailed prairie dogs throughout their range is as

follows:

~~Arizona-~~The black-tailed prairie dog is classified as extirpated on the AGFD's list of *Threatened Native Wildlife in Arizona* (AGFD 1988). The Arizona Game and Fish Commission in July 1988 approved this list, in public session, after comment was solicited and considered from government agencies, professional and academic biologists, and the public. It provides policy guidance to state and federal agencies and the public on AGFD priorities. It does not provide specific legal or regulatory protection for listed species. However, the general provisions of Arizona Revised Statutes, Title 17, protect federally listed species, as well as all native wildlife.

In Arizona, the AGFD classifies all prairie dog species as nongame mammals. In 1999, the hunting season for black-tailed prairie dogs was closed.

~~Colorado-~~The black-tailed prairie dog is classified under Colorado Wildlife Commission regulation #300 A.2 as a small game species. Regulation #302.B sets method of take, which includes rifles, handguns, shotguns, handheld bows and crossbows, pellet guns and slingshots, hawking, and toxicants. The season is year-round, with no bag or possession limit (regulation #308). However, for hunt contests, no participant may take more than five prairie dogs during the entire event (regulation #302-1.a.1).

A small game license is required to take prairie dogs, except that landowners, their immediate family members and designees may take prairie dogs causing damage on their lands without a license with the above methods of take. Some toxicants may be used only by licensed applicators regulated by the CDOA or the U.S. Environmental Protection Service but gas cartridges can be applied without a license. The CDOW does not promote prairie dog shooting or poisoning.

Translocation has been used in the recent past, particularly in the rapidly developing Front Range counties, to move prairie dogs from development sites. However, Senate Bill 99-111, which was passed by the Colorado State Legislature in its 1999 session, prohibits the translocation of prairie dogs and other species between counties without the consent of the county's commissioners.

~~Kansas-~~The black-tailed prairie dog is classified as wildlife (KSA 32-701). Therefore a hunting license is required to hunt them (KSA 32-919) with specified legal equipment and taking methods (KAR 115-20-2). The season is open year round with no limits.

In 1901 and 1903, the Kansas legislature passed laws (KSA 80-1201,1203) authorizing townships to conduct prairie dog eradication programs and provide funds for Kansas State Agricultural College to hire a field agent to direct and conduct experiments for the purpose of destroying prairie dogs and gophers (Lantz 1903). In recent years some counties have invoked "Home Rule" to take over authority for prairie dog control from the townships and impose mandatory control requirements on landowners. The landowner is first given the opportunity to control prairie dogs on their land and if they fail to do so it is done by the county at the landowner's expense (Lee and Henderson 1989). A prairie dog control permit (KAR 115-16-2) is required to use any poisonous gas or smoke to control prairie dogs, except toxicants labeled and registered for above ground use. Each permit needs to be

approved by the Secretary of the KDWP and the extension specialist in wildlife damage control.

Montana-Prairie dogs are legally categorized as rodents and vertebrate pests (Mont. Code Ann. 7-22-2207), subjecting them to systematic suppression by the Department of Agriculture.

Nebraska-The black-tailed prairie dog is currently considered an unprotected nongame species in Nebraska. This allows them to be taken by any manner, without restrictions, including shooting or control activities. Permits are not required for residents to take prairie dogs; nonresidents must have a small-game hunting permit to take prairie dogs in the state. Most prairie dogs occur on private land in Nebraska and permission of the landowner is required before entering private property. A statute dating back to the early 1900's, requiring extermination of prairie dogs on private and state-owned lands in the state was repealed in 1995.

In 1996, the NGPC adopted a policy on the shooting of prairie dogs. The agency recognized prairie dog shooting as a legitimate recreational activity while also recognizing the importance of prairie dog communities to a variety of interdependent wildlife species. The NGPC does not actively promote prairie dog shooting. With the location of Nebraska on the eastern edge of the prairie dog range and on Interstate 80, the agency receives numerous requests for information on shooting prairie dogs. Providing general maps and other information fulfills these requests. Specific locations of prairie dog colonies are not provided.

New Mexico-Black-tailed prairie dogs receive no specific legal protection from regulations administered by the NMDGF (NMSA 1978 (1988 Repl.)). Statutes under which the New Mexico State Department of Agriculture (NMSA 1978) operates offer no protection to this species. Portions in the latter statutes direct the State of New Mexico to cooperate with the federal government to destroy predatory wild animals and rodent pests in the interest of the protection of crops and livestock and the improvement of range conditions. The Arizona black-tailed prairie dog (i.e., *C.I. arizonensis*) was included on the NMDGF listing of threatened and endangered species from 24 January 1975 until its delisting on 10 February 1978 (Jones and Schmitt 1997). From 10 February 1978 until 9 January 1988, black-tailed prairie dogs in the Tularosa Basin of south central New Mexico were included on the same listing of threatened and endangered species (Jones and Schmitt 1997). Presently, no populations of black-tailed prairie dogs are listed as threatened or endangered under authority of the Wildlife Conservation Act (17-2-37 to 17-2-46 NMSA [1995 Repl]) by the NMDGF.

North Dakota-The black-tailed prairie dog is considered a nongame wildlife species by the North Dakota Game and Fish Department (NDGFD). A resident is not required to purchase a hunting license to shoot prairie dogs but nonresidents are required. North Dakota does not have a bag limit or season for prairie dogs.

Under state law the black-tailed prairie dog is listed as a pest and two pest laws apply to them. The first, passed in 1913, allowed for a bounty to be placed on prairie dogs. The second, passed in 1995, identified prairie dogs as a pest species under the law, which generally applies to noxious weed

control. A pest means any invertebrate, animal, pathogen, parasitic plant, or similar organism, which can cause damage to a plant or part thereof or any processed, manufactured, or other product of plants.

The State Department of Agriculture has the statutory authority and responsibilities of enforcing this statute. However, county weed boards will have jurisdiction on all lands within the county and make the on-the-ground decision of whether or not to initiate a suppression/eradication effort based on recommendations from county commissioners.

Oklahoma-The black-tailed prairie dog is classified under Title 800, ODWC Commission Regulation, as a Category II Mammal Species of Special Concern. This classification involves those species in which there is a concern over the long-term survival indicated by technical experts and insufficient documentation to adequately assess the population status/trend in the state.

Although the prairie dog is not designated a game species in Oklahoma, Subchapter 17 of Chapter 25, Title 800 outlines the legal means in which prairie dogs may be controlled in Oklahoma. Prairie dogs may not be killed by any means except rifle, shotguns, handguns, and bows and arrows. Prairie dogs may be controlled with the use of poisons subject to the provisions of Subchapter 17. A permit is required of all landowners and operators in Oklahoma prior to any prairie dog control work involving the use of poisons, including solid chemicals and gases. The permit must be obtained from the ODWC and can be issued for periods up to 90 days. Permit restrictions for the use of poisons in prairie dog control include: 1) permits may not be issued by the ODWC to reduce prairie dogs in any county to fewer than 1000 prairie dogs, and 2) The killing of prairie dogs with poisons shall not be permitted on public lands.

The Director of the ODWC may issue permits for the total or partial control of prairie dogs on the State School Lands. Prior to issuing such permits, the Commissioners of the Land office shall advise the ODWC of the sites to be included in their program. Each site shall be evaluated for the presence of endangered, threatened or otherwise unique or uncommon wildlife species and the potential adverse impact that might be caused by a control program. Permits will be conditioned, as necessary, to assure that the control efforts do not threaten the continued existence of other species of concern that may be found in association with prairie dog towns.

While poisoning and recreational shooting of black-tailed prairie dogs can occur on private land, the ODWC does not promote either activity. Prairie dog eradication is no longer mandatory in Oklahoma. In order to hunt prairie dogs in Oklahoma, one must have a resident or nonresident hunting license or proof of exemption. Because most of the prairie dogs in the state occur on private land, hunters must seek permission from the landowners. The ODWC does not coordinate hunters looking for prairie dog shooting access with landowners. Inquiries about access to prairie dogs for recreational purposes are referred to the local chamber of commerce.

The ODWC does not actively translocate black-tailed prairie dogs, but restorations of prairie dog towns have been conducted on the Wichita Mountains National Wildlife Refuge, Canton Wildlife Management Area, Darlington Game Farms near El Reno, and other locations (Caire et al. 1989). In

1998, the ODWC did assist the Oklahoma Department of Transportation with the relocation of 52 prairie dogs from a highway project right-of-way to ODWC property in north central Oklahoma. These translocated prairie dog towns are closed to prairie dog hunting.

South Dakota-The black-tailed prairie dog currently has state designations under two different authorities in South Dakota. This species is a game species regulated by the SDGFP (South Dakota Codified Law 41-1-1). Since January 1, 1999, the species is further designated as a predator/varmint, a statutory action taken primarily for hunting license purposes. Residents must possess a Game and Fish or Sportsman's License to shoot prairie dogs; nonresidents must possess a Predator, Small Game, Waterfowl, or Big Game License. Aside from license requirements, the black-tailed prairie dog is unregulated by the SDGFP; i.e., no limits exist on times, places, or quantities, aside from closures or other limitations on federal, tribal, or state park lands.

As part of its Systematic Approach to Management planning effort, the SDGFP released a strategic plan for the black-tailed prairie dog in March 1994 (SDGFP 1994). This plan contains objectives and strategies designed to accomplish the following goal in South Dakota:

"To achieve and maintain populations of prairie dogs that will preserve this unique ecosystem, help buffer predatory losses to livestock and provide increased recreational opportunity consistent with economic, ecological, social, and aesthetic values for the people of South Dakota and its visitors."

The black-tailed prairie dog has been designated as a statewide pest since 1984, an action taken by the South Dakota State Weed and Pest Control Commission (SDWPCC). South Dakota Codified Law (SDCL) Chapter 38-22 provides for the control of noxious weeds and declared pests. Control operations may be directed at those populations considered threats to neighboring property. The costs of such control must be borne by the landowner. The SDWPCC supports control efforts that are legal, biologically sound, and economically feasible (South Dakota Department of Agriculture, no date).

This species is also statutorily addressed in South Dakota's threatened and endangered species law, which became effective in 1978. SDCL Chapter 34A-8-7 directs the secretaries of South Dakota Department of Agriculture and SDGFP to "establish and conduct control programs at state expense on private lands that are encroached upon by prairie dogs from contiguous public lands."

Texas-Several agencies have statutory responsibilities for prairie dogs in Texas. The Texas Parks & Wildlife Department (TPWD) designates prairie dogs as a nongame species (TPW Code 67.001), and is prohibited from listing them as an endangered species (TPW Code 68.020). A hunting license is required to hunt prairie dogs (TPW Code 42.002) and there is no season or bag limit. Because most prairie dogs in the state occur on private land, hunters must seek permission from the landowners. There is no program within TPWD that coordinates hunters looking for access to private lands for shooting. TPWD has the authority to establish regulations on the taking, possession, propagation, transportation, importation, exportation, and sale of prairie dogs (TPW Code 67.004), and in January 1999, a new regulation for the collection and sale of nongame wildlife was

established. This new regulation requires a nongame collection or dealer's permit to possess more than 10 prairie dogs or to sell any number of prairie dogs.

Under Chapter 825 of the 1989 Texas Health and Safety Code, (Predatory Animals and Animal Pests), authority is given for the state to cooperate with appropriate federal officers and agencies in controlling predators and rodents to protect livestock, food and feed supplies, crops, and ranges. It further authorizes the Commissioner's Court of a county to purchase poisons to destroy animal pests and authorizes landowners, lessees, and tenants to apply poisons on their lands. Texas Department of Agriculture (TDA) is given responsibility to provide commissioner's courts who request it, information on controlling predators and rodents as defined under Section 825.021. To be interpreted consistently with TDA's mandates under Chapter 76 of the Texas Agricultural Code and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), this effectively means that TDA can provide information in response to a request to identify registered products labeled for controlling prairie dogs. TDA currently registers a number of restricted use rodenticides labeled for control of prairie dogs. These can be legally applied only by a licensed applicator.

Wyoming-The black-tailed prairie dog is a nongame wildlife species in Wyoming and is listed by the WGFD in the Nongame Bird and Mammal Plan (Oakleaf et al. 1996) as a Species of Special Concern. The black-tailed prairie dog is also covered by Chapter 52 (Nongame Wildlife) of the Wyoming Game and Fish Commission Regulations. Under Section 6 of the Regulation the species may be taken during the calendar year without securing a permit.

The WDOA classifies the black-tailed prairie dog as a pest under Statute W.S. 11-5-101 through 11-5-119 (Weed and Pest Control Act of 1973), allowing uncontrolled take.

With the exception of approximately 20,000 acres on Thunder Basin National Grassland and small or parts of colonies, which occur on BLM lands, most prairie dogs occur on private land.

Recreational shooting of black-tailed prairie dogs takes place throughout the range in Wyoming. No license is required and there is no restriction on take. Any weapon may be used. The WGFD does not provide recreational shooters locations of black-tailed prairie dog colonies and does not encourage recreational shooting. Thunder Basin National Grassland uses recreational shooting, along with poisoning, to prevent expansion of prairie dogs beyond designated protection and management areas on the Grasslands. The WGFD has not relocated black-tailed prairie dogs.

Canada-the Committee on Endangered Species and Wildlife lists the species as vulnerable.

Mexico-the black-tailed prairie dog is listed as threatened. The other species of prairie dog found in Mexico, the Mexican prairie dog (*C. mexicanus*) is listed as endangered. It is in the same subgenus as the black-tailed prairie dog.

RISK ASSESSMENT

For the 90-day finding, the Service assessed real and/or potential problems identified in the petition

that face the black-tailed prairie dog, based on one or more of the following five factors, as required by Section 4(a)(1) of the Act. In their 90-day finding, the Service concluded that the following factors act both alone, and in concert, to affect the status of the black-tailed prairie dog and a complete status review was needed for the species. The cooperators to this agreement acknowledge that more aggressive management for black-tailed prairie dogs is needed at this time to ensure the viability of the species rangewide and this management can be accomplished at a coordinated state level. The factors identified by the Service in their 90-day finding are presented in the first part of this risk assessment. The wording is almost verbatim as to how it appeared in the Federal Register. The cooperator's evaluation and corrective solutions for these factors are the second part. In some cases, parts of the solution may already be implemented. The risk assessment is as follows:

1. Present or threatened destruction, modification, or curtailment of its habitat or range.

The petitioners asserted that conversion of prairie habitat to farmland was one of the primary causes of the decline in occupied habitat of the black-tailed prairie dog. Between 1880 and 1899, 104 million ac (42 million ha) of the western plains surface area were converted to crop productions (Laycock 1987). Native grasslands have been reduced by approximately 60 percent (Burke in prep.) resulting in significant destruction of black-tailed prairie dog habitat. Some agricultural conversion of native grasslands continues today, and could accelerate with the increase of dry land cropping and use of genetically engineered drought resistant crop strains. Hexem and Krupa (1987) identified 57,700,000 ac (23,400,000 ha) of unplowed land in the western Great Plains with potential for cropland conversion. Such conversion could significantly reduce the remaining native prairie and black-tailed prairie dog habitat.

Urbanization also presents a significant loss of black-tailed prairie dog habitat in local areas near metropolitan areas throughout the Great Plains such as Helena, Montana (Knowles 1995); and the Front Range of Colorado near Denver (USFWS 1999). Habitat loss also occurs through degradation of burrows and vegetation changes in areas where black-tailed prairie dogs have been removed. Once underground burrows collapse or there is an increase in woody or taller vegetation, the species is less likely to reestablish itself in the area. At the Rocky Mountain Arsenal National Wildlife Refuge in Colorado, reintroduced black-tailed prairie dogs quickly reestablished themselves where intact burrows constructed by previous prairie dogs (extirpated by sylvatic plague) had not deteriorated (Seery, USFWS, pers. comm. 1998). Where burrows had deteriorated, prairie dogs established themselves slowly and with little success.

Weltzin et al. (1997) determined historically, black-tailed prairie dogs, and the herbivores and granivores associated with their colonies probably maintained grassland and savanna by preventing woody species from establishing or attaining dominance. List (1997) reported that poisoning of black-tailed prairie dogs in Mexico resulted in the invasion of mesquite shrubs that rendered the landscape unsuitable for reoccupation by the species; moreover, fire suppression would likely maintain this situation. Davis (1974) also noted that removal of the species from some sites in Texas resulted in the invasion of brush. Thus, when degradation of burrows or vegetation changes occur, the amount of habitat suitable for recolonization may be reduced. Current levels of conversion of rangeland to farmland or urban development may not be as important to the species' numbers and

viability as are direct losses caused by poisoning or disease. These direct losses of individuals or local populations may result in habitat loss for the species through the deterioration of burrows and the alteration of vegetative communities.

Evaluation: It is difficult to determine the degree of destruction, modification, or curtailment of the species habitat or range. Although there are estimates of occupied black-tailed prairie dog habitat from the turn of the century, these estimates are most likely exaggerated and extrapolated from partial data sets. While it is true occupied prairie dog habitat has been reduced and fragmented by conversion of grasslands to agriculture, urbanization, invasion of woody plants, and poisoning black-tailed prairie dogs are still relatively abundant and widespread with opportunities for management and significant recovery (Knowles 1998). For example, Hoogland (1995) states that prairie dogs typically have unused suitable habitat at their disposal. Suitable unoccupied habitat has been identified in New Mexico and Montana and translocation efforts have been initiated with some degree of success (Matchett 1997, Truett and Savage 1998). Other unoccupied habitat is still present across the range of the species. In 1995, the AGFD identified 10,989 acres of habitat on Fort Huachuca exhibiting characteristics that would be considered moderate or excellent for prairie dogs (Van Pelt and Belitsky 1995). In 1992, based on the Natural Resources Conservation Service's National Resources Inventory (NRI), a statistically based sample of land use and natural resource conditions and trends on nonfederal lands in the United States showed a majority of the nonfederal land within the black-tailed prairie dog range was in rangeland. The lands within the High Plains as a whole have less than a five-percent high potential for conversion to cropland in the next 10-15 years.

Solution: Current conservation actions are focused on identifying and conserving unoccupied habitat, and at a minimum, maintaining the current level of occupied habitat on federal and tribal lands until the population viability analysis (PVA) funded by the USFWS can be completed. Poisoning restrictions and other land management actions on USFS and BLM lands and current management practices of Native American tribes conserve significant core areas of black-tailed prairie dogs. Once the PVA is completed, land protection efforts under federal, state, and tribal land management programs working through the Conservation Agreement can then focus conservation efforts on additional habitat important to black-tailed prairie dog conservation. Existing federal laws and policies are presently in place and are adequate to provide for such actions, especially in regard to lands under management jurisdiction of the BLM, National Park Service (NPS), USFWS, and USFS. Some of the Native American nations have already developed plans to manage for sustainable occupied prairie dog habitat on their lands. On private lands, the potential for habitat conservation measures is limited by

the extent to which the landowners wish to cooperate in such programs. However, in some states such as New Mexico, private landowners are already reintroducing black-tailed prairie dogs. Before such proposals are made in other areas, better information is needed on what are suitable prairie dog habitat, and the extent to which dispersal or recolonization is likely. Incentive programs need to be developed to increase private landowner interest in prairie dog conservation.

2. Overutilization for commercial, recreational, scientific, or educational purposes.

One activity impacting black-tailed prairie dog populations, in some local areas, is unregulated recreational (sport or varmint) shooting. Shooting has increased appreciably in popularity in recent years. An example of this is the Buffalo Gap National Grassland in South Dakota where the number of annual shooter days has increased from a few hundred in the mid-1990's to an estimated 6,500 in 1998 (Perry, USFS, pers. comm., 1998). High-powered rifles with high-quality scopes enable the modern varmint shooter to be consistently accurate at distances of 400 yards or greater, and an individual shooter may shoot a considerable number of animals each day (Kayser 1998). Only three states do not require a hunting license for taking prairie dogs. Prairie dog density may decrease with increased shooting pressure and prairie dogs may spend more time on alert and less time foraging (Vosberg 1996). Shooting also may contribute to population reduction and fragmentation, reduce colony productivity and health, contribute to the loss of non-target species, and preclude or delay recovery of colonies reduced by other factors such as sylvatic plague. Recreational shooting may significantly impact colonies in local areas where shooting is most intense or colony numbers are already reduced from other losses.

Evaluation: It is recognized that shooting did not contribute as much as habitat conversion and poisoning to historical prairie dog declines. However, it has been demonstrated that shooting can reduce or suppress local populations of prairie dogs, which could make them more susceptible to catastrophic events such as a disease epizootic. Fox and Knowles (1995) concluded it would require approximately one recreational day for every 15 acres of prairie dogs to significantly influence prairie dog populations. However, an example of a significant local impact exceeding the one recreational day per 15 acres threshold is the Conata Basin area of the Buffalo Gap National Grassland, one of the seven large black-tailed prairie dog complexes found in North America. In 1998, 6,500 shooter days occurred on 9,000 acres, which equals one shooter day for every 1.38 acres (Perry, USFS, pers. comm., 1998). Mulhern and Knowles (1995) stated that this level of shooting pressure is unlikely over the hundreds of thousands of acres of currently occupied black-tailed prairie dog range, which would not influence populations rangewide but could significantly affect local populations. On some tribal lands, prairie dog shooting is managed to generate revenue for the tribes, which creates an incentive to manage the species. Typically, it is the responsibility of the state wildlife agency to set bag limits and seasons for shooting prairie dogs. Some of the states have regulations in place for prairie dogs but protection is

limited. For example, Arizona has closed the season on black-tailed prairie dogs. Colorado has a bag limit of five prairie dogs during shooting contests, and Texas limits the number of live prairie dogs one can possess. In some cases, regulations for the state agriculture and wildlife agencies conflict in regulating the level of take of prairie dogs which makes it difficult to determine and promote the viability of the species in a given area.

Solution: Current conservation actions are focused on evaluating current regulatory measures and determining if modifications are necessary to ensure the viability of the species. For example, modifications could include more restricted hunting seasons, areas closed or with limits on prairie dog shooting, bag limits, or more defined criteria for control actions. In addition, in states where prairie dogs can be collected live (vacuuming or flooding) and possessed for commercial or scientific use, impacts to the population will be monitored. If it is determined that these impacts are affecting the viability of the species, regulations will be modified to address these impacts.

3. Disease or predation.

Sylvatic plague is a disease caused by the bacterium, *Yersinia pestis*, which fleas harbor and transmit to rodents and other species (Cully 1989). The term "sylvatic" refers to the occurrence of the disease in the wild (Berkow 1982). Barnes (1993) recorded sylvatic plague in 76 species of six mammalian orders, although it is primarily a rodent disease. Rodent species vary in their susceptibility to plague, with some species acting as hosts or carriers of the disease or infected fleas and showing no symptoms (e.g., kangaroo rats, *Dipodomys* spp., and deer mice, *Peromyscus maniculatus*). Conversely, prairie dogs show nearly 100 percent mortality when exposed to sylvatic plague (Barnes 1993, Cully 1993). Scientists discovered the plague among wild rodents near San Francisco in 1908 and it has spread throughout much of the Great Plains over the past century (Eskey and Haas 1940, Miles et al. 1952 in Cully 1989, Ecke and Johnson 1952). Black-tailed prairie dogs show neither effective antibodies nor immunity to the disease. Generally for all prairie dog species, death occurs quickly for individuals that are exposed to plague; noticeable symptoms usually do not develop (Cully 1993). Data obtained from the Rocky Mountain Arsenal National Wildlife Refuge show that plague has the potential to severely depress black-tailed prairie dog populations and cause local extirpations (Seery and Matiatos, in press; USFWS 1998). Scientists have also observed long-term plague-related declines in white-tailed prairie dogs near Meeteetse, Wyoming (USFWS 1999).

Many mammals, snakes, and raptors prey on prairie dogs (Hoogland 1995) and the species has evolved resilience to natural levels of predation. Scientists do not generally see predation as a threat to the species but in unusual circumstances intense levels of predation may be problematic to individual small colonies, particularly if they are already reduced by other causes.

Evaluation: While plague occurs throughout the western United States, its prevalence and effect on prairie dog populations are greatest in Arizona, Utah, Colorado, New Mexico, Montana, Wyoming, and Texas, but is less severe in the

Dakotas, Nebraska, Oklahoma, and other areas of the black-tailed prairie dog range. Plague epizootics affect localized populations of prairie dogs but because some areas in the United States are plague-free, or epizootics are sporadic in nature, black-tailed prairie dogs do not appear to be in any imminent threat of extinction due to plague. Knowles and Knowles (1994) suggested that prairie dogs have survived introduction of the plague simply due to their highly dispersed populations. Although further reductions in size and number of populations could make prairie dogs more susceptible to local and regional extirpation, progress of the disease has probably been slowed by the increasing isolation of small colonies as a result of past control efforts. The WGFD reported in their nongame annual report that the white-tailed prairie dog population in Shirley Basin has fluctuated annually in the presence of plague, but has not precipitously declined as happened at the Meeteetse Complex, and individual colonies have shown recovery.

Solutions: At this time, in association with black-footed ferret recovery, conservation measures are focused on studying how plague affects prairie dog populations, monitoring its presence in an area, and developing control measures or barriers that include nonlethal methods to limit its progression in a prairie dog complex.

4. Inadequacy of existing regulatory mechanisms.

All states within the historic range of the black-tailed prairie dog classify the species as a pest for agricultural purposes and either permit or require their eradication (Mulhern and Knowles 1995). Fish and wildlife agencies in many states classify black-tailed prairie dogs by categories such as unclassified game that permit licensed or unlicensed shooting with no limitations on take or season. Knowles (1995) reviewed federal regulatory management policies as they relate to the black-tailed prairie dog. Significant black-tailed prairie dog occupied habitat is found on tribal lands and public lands managed by the BLM, USFWS, USFS, and the NPS. The BLM manages prairie dogs to meet multiple-use resource objectives (Knowles 1995). Various National Forest Resource Management Plans address black-tailed prairie dog habitat on USFS-administered land; these plans reflect USFS policy, not regulation. Two tribes have voluntary prairie dog management plans in place (Knowles 1995). In some areas where black-footed ferrets are being reintroduced, programs are in place to manage prairie dog populations to preserve black-footed ferret habitat.

Evaluation: Across its range, the black-tailed prairie dog, has various classifications ranging from agricultural pest to nongame mammal. In four states, Colorado, Kansas, North and South Dakota, prairie dogs are classified as a legal agricultural pest with some level of either state or local mandatory controls in effect. Prairie dogs in Wyoming are classified as agricultural pests but detriment to other landowners has to be proven before control can be mandated, and eradication is not necessary. In Montana, New Mexico,

Oklahoma, and Texas control is not mandatory, but assistance may be provided to landowners requesting prairie dog control. However, Arizona, Colorado, and Texas have regulations on hunting seasons, bag limits under certain conditions, or possession limits for commercial use of black-tailed prairie dogs, respectively. While classifications result in different management actions for the species, they are imbedded in state laws and state hunting regulations. In some cases, this may require legislative change, which can prove to be challenging when some state legislatures only meet biannually to address new or amendments to existing laws.

Solutions: At this point in time, states are reviewing and evaluating current laws and regulations to determine which regulations have precedence and their affect on black-tailed prairie dogs. States will implement actions for state laws and regulations that will contribute to the continued viability of the species.

5. Other natural or manmade factors affecting its continued existence.

Control (Poisoning)

Hanson (1993) cited poisoning as a major factor in the reduction of prairie dog populations. An extensive poisoning effort has occurred over most of the species' range (Bell 1921, Cain et al. 1971, Anderson et al. 1986, Roemer and Forrest 1996, and Forrest and Proctor in prep.). Organized prairie dog control gained momentum from 1916 to 1920, when property owners and federal agencies poisoned prairie dogs on millions of acres of western rangeland (Bell 1921). From 1937-1968, 30,447,355 ac (12,321,875 ha) of occupied prairie dog habitat were controlled (Cain et al. 1971). After the 1970's some toxicants previously used for prairie dog control were banned and although prairie dog control continued, it occurred at a reduced rate.

Federal agencies and private individuals are involved to varying degrees in active control of prairie dog colonies. The Environmental Protection Agency regulates use of prairie dog poisons. The APHIS-WS provides technical assistance and distributes prairie dog poison to state and federal agencies, tribes, and private landowners. Based on information obtained from the APHIS Freedom of Information Act web page (foia.aphis.usda.gov), the agency distributed or applied enough poison to control 95,076 acres of black-tailed prairie dog habitat from 1991-1996. Although this number could have included some acreage that was treated more than once, this number indicates that over a 5-year period, AHPIS-WS alone has conducted prairie dog control on 14 percent of the estimated remaining black-tailed prairie dog habitat.

Control programs have significantly reduced black-tailed prairie dog populations. These programs essentially remove all animals from the area treated and directly contribute to habitat fragmentation and vegetation changes that limit future recolonization by the black-tailed prairie dog. In particular, federal control programs may play a significant role in the continued decline of black-tailed prairie dog populations.

Habitat Fragmentation

The grassland biome in North America has arguably suffered the most extensive fragmentation and transformation of any biome on the continent (Groombridge 1992). More fragmented, more isolated, and less connected populations usually have higher extinction rates (MacArthur and Wilson 1967, Wilcox and Murphy 1985, Clark 1989). Miller et al. (1996) described existing prairie dog populations as small, disjunct, and geographically isolated. They further describe the discontinuous nature of remaining populations as widely separated islands where habitat fragmentation has increased the likelihood of individual colony extinction due to genetic inbreeding and random demographic events. Lost genetic diversity is inherently detrimental to most species. Black-tailed prairie dog dispersal movements that previously offset these adverse effects likely are limited by short migration distances, as reported by Hoogland (1995) and Knowles (1985), and longer distances between remaining colonies.

Evaluation: Historically, it was estimated that black-tailed prairie dogs did not inhabit all of the available habitat, but only inhabited 3-20% of it (Knowles 1992). There is anecdotal evidence that black-tailed prairie dog numbers decreased following the extermination of the bison in the mid to late 1800s (Meade 1898 as in Knowles 1995), and an increase in numbers after the advent of homesteading (Merriam 1901 as in Knowles 1992). Fragmentation of the black-tailed prairie dog range began in the early part of the 1900s as a result of poisoning. While fragmentation from poisoning still occurs throughout the range of the black-tailed prairie dog, it does not occur in the same degree or intensity as past efforts. For example, there has been no organized control on BLM administered lands for over two decades and currently the USFS has banned poisoning on National Grasslands until the status review has been completed. On Native American lands, prairie dogs were controlled extensively up until the early 1990s. In 1992, the USFWS issued a jeopardy opinion for black-footed ferrets in regards to prairie dog control on the Cheyenne River and Rosebud Indian reservations in South Dakota. Since issuing that opinion, no funding for prairie dog control has been approved by Congress for distribution by the Bureau of Indian Affairs. Fragmentation may actually be beneficial to prairie dogs. As mentioned in the evaluation of Factor 3, *Disease and predation*, Knowles and Knowles (1994) recognized that fragmented and isolated prairie dog populations may actually be protected from a plague epizootic and may be a source of animals for future recolonization efforts. Management options exist to reduce the effect of control on the species (i.e. during control measures entire towns do not need to be eliminated). Depending on the type of rodenticide used to control prairie dogs and its efficiency at reducing numbers, population recovery can return to the same level as it was prior to treatment in as little as 10 months (Apa et al. 1990). Portions of prairie dog towns could be controlled or

translocated to other areas where less conflict exists. Truett and Savage (1998) have successfully reintroduced black-tailed prairie dogs into portions of New Mexico where they were once extirpated for at least 30 years. Translocation efforts would occur in areas that would increase connectivity of populations, and thus contribute to the species viability. However, with great reductions in numbers, fragmentation, and translocation genetic variation can be lost using this management option.

Solutions: Control measures are being reviewed and other alternatives of control are being evaluated. For example, some Native American tribes have plans in place using alternative means such as pasture rotation to control prairie dogs. States with restrictions on translocation of wildlife species will review existing regulations, and if necessary, implement changes that will allow translocation of populations onto public lands or willing private landowners.

CONCLUSION

Historically, black-tailed prairie dogs occurred across a majority of the short and mid-grass habitats of North America, and in adjacent areas of Mexico and Canada. While the occupied range of the species has been greatly reduced, the species still occurs in great numbers and occupies hundreds of thousands of acres. As populations become localized and reduced in density from shooting, poisoning, and habitat conversion they can become more susceptible to local extirpation when a catastrophic event, such as a plague epizootic, occurs. Plague is an unknown factor in the equation for conserving the species. While work is currently being conducted on the ecology of the disease, humans have had trouble controlling epizootics over large areas. Although past control activities fragmented prairie dog towns, which may have assisted with the restriction of a plague epizootic, effects of the disease can be catastrophic enough in an area to severely impact recovery of the species for years.

Although a variety of human factors are acting collectively in suppressing black-tailed prairie dog numbers throughout their range, these factors usually affect populations at a local level and not rangewide. Human factors affecting the viability of the black-tailed prairie dog can be modified, as has been done in the past with the elimination of certain poisons, to promote the continued persistence of the species in the United States. By implementing management actions which might include eliminating mandatory control, regulating seasons or possession limits, maintaining and conserving habitat, and establishing core populations on public lands to provide animals for dispersal to uninhabited areas or individuals for recolonization, the cooperators of this conservation agreement will significantly contribute toward the conservation of the species. In term of actions, this translates into providing sufficient habitat to maintain self-sustaining populations that are well distributed across the Great Plains grasslands. Abundance of available food and suitable soil for burrow construction may be more important than a particular grass type. Above all, a reasonable balance between preservation and control needs to be identified.

The mosaic of habitats in which black-tailed prairie dogs have occurred in the United States is mirrored by a complex pattern of land ownership. A patchwork of federal, state, tribal, and private lands overlays the habitat mosaic. A conservation program for prairie dogs must consider both mosaics and provide opportunities and incentives for involvement by all interested and affected parties. It must include the approaches noted by Weber and Rabinowitz (1996) as hallmarks of successful conservation projects: field research (to provide a sound scientific basis for decisions); consideration of relevant cultural, economic, and political factors; design and implementation of a comprehensive approach to conservation (including public education); and monitoring and feedback. Unlike other protective measures, which often alienate segments of the population or stakeholders, this conservation agreement approach provides a forum for local involvement, participation, and acceptance for an effort directed at conserving the black-tailed prairie dog and its ecosystem.

CONSERVATION STRATEGY

INTRODUCTION

The black-tailed prairie dog is a North American species that plays an important role in maintenance of the Great Plains grassland ecosystem and the associated fauna. For a variety of reasons, this species has declined dramatically in distribution and abundance. Factors also contributing to this decline include the absence of management policies, necessary staff, and financial commitments to assure prairie dogs and associated species will persist. Currently, many states and some federal agencies in the range of the black-tailed prairie dogs have administrative and regulatory structures that either ignore their declining trend or contribute to the decline. The objective of the signatories to this Agreement is to promote viable prairie dog populations and the grassland ecosystems associated with them. The purpose of this document is to provide a structure that provides management and administrative reforms that need to be made and implemented to protect and enhance the persistence of prairie dogs and their associated ecosystems and the continuation of local (state) or tribal authority to manage these species.

The management framework proposed below includes a core of essential elements needed to achieve appropriate levels of security for black-tailed prairie dogs and their associated ecosystems in each state. In addition to these core elements, other elements are listed that may be needed in individual state plans to effectively conserve prairie dogs. This framework also recognizes that circumstances exist where population control is appropriate and seeks to identify these circumstances to provide appropriate recommendations for such control.

Absent any changes in current management of all prairie dogs, these species as well as other associated grassland species are, according to recent status reports, exhibiting trends that may merit listing under the Endangered Species Act. States and tribes desire to maintain their management flexibility and decision-space through concerted efforts to conserve prairie dogs and other grassland species. State and tribal management flexibility will be reduced if the black-tailed prairie dog is listed under the Endangered Species Act.

This Conservation Strategy describes the goal, objectives, strategies, and activities that will be implemented to further conserve black-tailed prairie dogs in the United States. It reflects the metapopulation concept for species persistence and an ecosystem management approach for habitat conservation. Planning and management proposals and actions will be coordinated among the states, the Service, tribes, other government cooperators, and private entities.

A feature of this Strategy is an interstate/intergovernmental Black-tailed Prairie Dog Conservation Team (BTPDCT). The purpose of the BTPDCT is to assist with and coordinate the activities of the states and other team members. This coordination will include: 1) Developing protocols for compiling information from the states in categories that can be aggregated to depict conservation measures occurring throughout the species' range, 2) Encouraging review and dialogue regarding means for balancing legitimate needs for both protection and control, and; 3) identifying research needs and helping to obtain funds to implement projects. BTPDCT members may be assigned to

various technical committees as information or other needs (e.g. review of materials) arise. Each state wildlife agency BTPDCT member is responsible for coordinating the Conservation Strategy activities within its respective state. Any member of the public may attend BTPDCT meetings, provide comments on documents and proposed actions, and attend state work group meetings, when they are established by the state.

Species restoration and habitat conservation are linked to key federal, state, tribal, and private land ownership patterns. This Strategy identifies both short and long-term objectives, and sets various time frames to complete activities. The state wildlife agencies will implement this Strategy and will aggressively seek new funds to enhance agreement implementation.

Effective conservation of the black-tailed prairie dog and its habitat under this Strategy will necessarily depend on cooperation of federal, state, tribal, and private landowners and stewards. Thus, all cooperators must, from the beginning, be aware of the importance of full involvement of private landowners to the extent they wish to be involved, and further recognize the importance of compatible rural livelihoods and activities, such as ranching and outdoor recreation (including hunting and wildlife watching), and voluntary participation by private landowners in habitat identification, enhancement, and conservation, as key to the Conservation Strategy.

GOAL

The goal of the Conservation Agreement is to conserve viable black-tailed prairie dog populations in the United States, while recognizing the legitimacy of control as well as preservation of the species, and to encourage parallel conservation actions in Mexico and Canada, by (a) gathering, sharing, and disseminating information on status, biology, habitat use, and management needs; (b) identifying and maintaining habitat suitable for population maintenance, expansion, translocation, and possible reintroduction in the United States; (c) allowing for innovative, active, and adaptive management; (d) creating strong private-public partnerships; (e) implementing any state regulations needed for population management, conservation, and control; and (f) identify and secure funding sources to mitigate landowner losses and promote prairie dog conservation.

The actions under this Agreement will: (a) promote conservation of the black-tailed prairie dog and its habitat; (b) reduce risk of overutilization of the black-tailed prairie dog for commercial, recreational, scientific, or educational purposes; (c) focus use of existing regulatory mechanisms to maintain species viability; (d) reduce risk of any other factors affecting continued existence of the black-tailed prairie dog in the United States; and (e) increase landowner participation in prairie dog conservation efforts by minimizing impacts from lost management options.

Although this Conservation Agreement focuses on black-tailed prairie dog conservation, participants recognize the risks identified for black-tailed prairie dogs also affect other species of prairie dogs and associated grassland species. Initially, participants agree to direct their conservation actions at black-tailed prairie dogs, but when applicable, will work toward the conservation of all prairie dog species and grassland associates.

CONSERVATION OBJECTIVES AND STRATEGIES

The Black-tailed Prairie Dog Conservation Agreement has nine objectives, with a varying number of activities under each objective, for conserving black-tailed prairie dogs across their range. These objectives allow cooperators to manage black-tailed prairie dog populations in a manner that preserves the long-term viability of the species while also maintaining management flexibility. The nine objectives are as follows:

1. Implement the Conservation Strategy
2. Establish a Black-tailed Prairie Dog Conservation Team and state working groups, which will develop, coordinate, and implement individual state management plans for black-tailed prairie dogs.
3. Determine and monitor species distribution and status.
4. Cooperate with Mexico and Canada.
5. Identify, maintain, and promote existing and additional suitable prairie dog habitats, which includes identifying landowner incentives, stewardship agreements, and manageable population levels.
6. Educate the public.
7. Identify, prioritize, and implement research needs.
8. Establish regulatory protection.
9. Evaluate progress and accomplishments.

CONSERVATION ACTIVITIES

1. Implementation of the Conservation Strategy.
 - A. To initiate conservation efforts in a timely fashion, this Conservation Agreement will be signed, at a minimum, by all state wildlife agencies within the historic range of the black-tailed prairie dog by **October 29, 1999**. This does not preclude any other state, federal, tribal, or local entity that wishes to cooperate in this endeavor from signing. Those wishing to sign the Conservation Agreement need to notify, in writing, Bill Van Pelt of their interest. Having a minimum of all state wildlife agencies signing identifies an entity to coordinate on-the-ground conservation activities. Other elements of this Strategy will be developed and implemented through individual state management plans and through the cooperation from federal, state, tribal, and

- other government cooperators, and through partnerships with private landowners and organizations.
- B. It is fundamental that the needs of the black-tailed prairie dog be met in the context of a wide spectrum of other wildlife needs and a variety of land uses on federal, state, tribal, and private lands. Thus, it follows that this Strategy be implemented in complete recognition of those factors, and through close coordination with other current or future planning and management efforts. These would include federal, state, and tribal management efforts, as well as private cooperative endeavors in ecosystem, wildlife, and land management. Any proposed changes to management plans or other land uses will be done in consultation, cooperation, and coordination with the lessees, permittees, other involved landowners, and any state or states having lands within the area covered by the proposal, per Section 8 of the Public Rangelands Improvement Act (PRIA) (Public Law 95-514/714/1978, U.S.C. Title 43 §1901).
- C. Although this Strategy applies to the full historical range of the black-tailed prairie dog in the United States, implementation of elements will be focused at a state level. This restricted geographic approach will allow available resources to be focused in an area.
- D. Participation in this Conservation Agreement is strictly voluntary. Parties are not legally bound to take actions that are prohibited by current laws and regulations. No party is committed to expend funds not otherwise available for the purposes set forth in this Agreement. In addition, parties of this agreement recognize the rights and legal authorities of all private, state, federal, and tribal entities for managing lands under their ownership or jurisdiction.
2. Establishment of a Black-tailed Prairie Dog Conservation Team (BTPDCT) and state working groups.
- A. The BTPDCT will be comprised of one representative from each signatory to the Conservation Agreement. This is necessary to ensure that members have the authority to carry out the actions to which they voluntarily agree.
- (1) The state wildlife agencies will be known as the lead in developing and implementing this Strategy. Each state is to ensure that individual state management plans support conservation measures identified in the Conservation Agreement. States will be required to assemble a state work group of interested entities and individuals to establish state prairie dog management plans. By **October 30, 1999** each state wildlife agency will identify an individual to coordinate prairie dog conservation measures.

- (2) State work groups will be known as cooperators in developing and implementing this Strategy. They will be comprised of a balanced representation of state and federal agencies and programs, local and tribal governments, private landowners, and interested organizations. Work group meeting will be open to the public. Work groups will determine their decision making process within their work group charter. Each state is to hold its first working group meeting by **October 15, 1999**.
- (3) Interested private citizens and organizations, state and federal agencies and programs, local and tribal governments will be encouraged to cooperate with the BTPDCT by attending its meetings and by participating in voluntary, action-specific agreements to promote black-tailed prairie dog conservation and education activities.

The BTPDCT will coordinate and assist in directing the activities outlined in this Strategy. It will review information provided by interested and affected parties, outline management guidelines, research, and education needs, ensure state prairie dog management plans contribute to the conservation of the species, and identify known and potential funding sources for carrying out prairie dog conservation work.

The BTPDCT will meet quarterly the first year either by conference call or in person. After the first year, cooperators will determine the necessary meeting schedule. BTPDCT meetings will be open to the public, with agendas available to the public and state working groups at least 30 calendar-days in advance, via a notice sent to each state wildlife agency where a state mailing list will be maintained. Arizona will host the first BTPDCT meeting in **December 1999**.

BTPDCT meetings will be hosted by each state within the range of the black-tailed prairie dog on a rotational basis. Each state will be responsible for setting up the meeting and ensuring information is distributed in a manner to allow for cooperators to process travel requests. The meeting should be planned in cooperation with the Swift Fox Conservation Team or another Great Plains species conservation team.

- (4) At the first BTPDCT meeting, one of the state wildlife agency representatives will be chosen by the other BTPDCT members to chair the team. This will ensure appropriate administrative support for BTPDCT meetings. The chair's term of office will be one year, without limit on the number of terms served. Subsequent chairs will be BTPDCT members selected by the team. Chairpersons will assemble the agenda for BTPDCT meetings and coordinate completion of the year-end evaluation report.

- B. Each State will establish a work group, to provide for direct public involvement in addressing specific black-tailed prairie dog conservation issues and reporting recommendations back to the BTPDCT.
- (1) Participation in a state work group is strictly voluntary. By **October 29, 1999**, a list of participants from the first state work group meeting, an outline of a proposed state management plan as discussed at their meeting or a completed plan will be submitted to Bill Van Pelt. In addition, work groups need to provide any information regarding on-the-ground activities initiated to conserve the black-tailed prairie dog. This information will be provided to the USFWS for their consideration during their status review.
 - (2) Work group participation may be at the organizational, governmental, or tribal level. Participation by representatives should be maintained as much as possible to ensure group continuity.
 - (3) Work group participants will be informed of all meetings at least 30 calendar-days in advance by notice sent to them from the mailing list being maintained by the state. If possible, agendas for each meeting should be provided with the notification.

Work groups are to have an agreed upon state prairie dog management plan in place and initiated by **October 1, 2001**. Work groups should adopt a philosophy and formally recognize prairie dogs and the habitat their colonies provide as valuable, important, and desired components of the landscape, while also recognizing the economic and political realities that control of the species may be necessary in some instances. State plans should identify: 1) Funding, 2) Personnel, and; 3) Time frames for implementing elements of their state plans. Conservation strategies should be coordinated within the state to encompass other management efforts including tribal and federal land management agencies and private landowners. State plans will be flexible enough to allow for modifications, as new information becomes available. In addition, state work plans need not be in place to begin conservation actions. If measures are being implemented during the development of the state plan, it should be acknowledged within the plan.

3. Species distribution, status, and monitoring.

- A. A body of recognized prairie dog and grassland ecosystem experts will be assembled for the purpose of advising the BTPDCT. With the assistance from these scientific experts in the fields of population genetics, population viability, prairie dog control, and wildlife diseases, the BTPDCT and state work groups will develop a long-term conservation goal for the entire range of the black-tailed prairie dog. This goal will

be expressed in number of occupied acres and individual towns of minimum size rather than in number of individuals. This goal will be developed and distributed to the state work groups to include in their individual state management plans by **August 15, 2000**.

- B. With assistance from the scientific experts mentioned above, the BTPDCT will develop a generalized rating system for prairie dog complexes to assist the states in identifying areas important to prairie dog conservation. Criteria may include, but are not limited to, the following:
- (1) Land ownership. For example, does an entity or landowner own the land with a commitment to prairie dog conservation?
 - (2) Sylvatic plague history within the complex and distance to known plague-affected complexes.
 - (3) Size and continuity of complex. For example, is the complex large, continuous, and without potential conflict with adjoining landowners, or is the complex composed of small towns within a checkerboard land ownership pattern?
 - (4) Demonstrated dependence of rare or sensitive species on the complex.
 - (5) Age and condition of the complex. For example, is the complex an old, degraded site with few options for long-term viability, or can the life span of the complex be prolonged with more aggressive grazing rotational systems or other management techniques?
 - (6) Potential for the complex to serve as a meaningful research site or demonstration area for landowners and land managers.
 - (7) Compatibility of prairie dog management with other mandated or traditional uses of the complex that is not in direct conflict with prairie dog management.
 - (8) Quality of habitat. For example, describe the soil type, elevation, vegetation composition, quantity of woody material etc.

This rating system will incorporate other needs of grassland species and be distributed to state work groups for consideration in their individual state management plans by **August 15, 2000**.

- C. Work groups will establish long-term state goals for total number of prairie dog-

occupied acres and for the number of occupied acres on different lands owned by different entities and **include them in their state management plan**. Work groups will take into consideration the amount of available habitat, land ownership, colony sizes contributing to the complex, and disease history when establishing these goals.

- D. The BTPDCT will evaluate and establish minimum survey methods, in concert with experts from the scientific advisory group, for estimating, in a statistically valid fashion, the total number of occupied prairie dog acres in each state. The methodology will be developed to allow for comparable analysis. Work groups should evaluate current monitoring techniques for accuracy, logistical ease, cost, and forward the results to the BTPDCT for consideration. Examples include the prairie dog inventory technique for black-footed ferret reintroduction, U.S. Forest Service aerial transect method, and landowner/land manager surveys with field verification of sample sites. Survey data should be updated every five years or less, **starting with the year 2000**. Occupied acres should be stratified and reported by land ownership categories (state, tribal, federal, and private). Population and trend assessments should determine the following within each state boundary: 1) Mean town (colony) size, 2) Number of towns, 3) Proportion of larger sized towns contributing to complex dynamics, 4) Total number of occupied acres, and; 5) Population fragmentation index (distance to nearest town). Protocols will also include an element to monitor plague that details sampling techniques, precautions, schedules, and identified laboratories capable of conducting plague testing. Plans should include provisions if disease is found to be limiting or reducing local prairie dog populations.
- E. Each work group will develop at least three population level objectives for areas within their state and **include them in the state management plan**. This will allow for the greatest flexibility and an adaptive management approach. Population and habitat objectives identified within the plans will be reassessed, as new information becomes available.
- (1) For planning purposes, state boundaries will be used. Although several BLM and USFS districts may occur within a state, each may or may not involve individual management plans. A statewide plan should summarize population information and be used from the population objective standpoint. Work groups will identify prairie dog management areas and develop population level objectives for these areas and **include them in their state management plan**. For example, it may be desired in a state plan to maintain USFS lands at maximum levels but state lands may be maintained at near optimum levels identified for that management area. The three levels and a discussion of each level are as follows:
- a. Maximum level-When acres of prairie dogs are above this level, and reductions are desirable, actions may be taken to reduce prairie dog populations. For example, actions might include: relaxation of

hunting regulations, promoting areas of shooting, translocation, or subsidizing or directing specific control efforts.

- b. Optimum level-The ideal or sustainable level of prairie dogs. Actions would likely include some form of managed sport shooting. Towns that are expanding may involve control while towns that are stable would likely be left alone. Towns that are declining would involve local protection efforts such as a shooting closure. Incentives to private landowners or grazing management practices would be used to maintain prairie dog population levels.
 - c. Protective level-If an area level falls below a certain level, protection measures should be taken. Efforts could include sport shooting restrictions, stricter criteria for control efforts, increased landowner incentives to encourage colonies to expand into unoccupied habitat, and establishment of disease control protocols. At this point, reintroduction or translocation efforts might be considered.
- (2) Population levels will be coordinated with the BTPDCT, based on objective science, and involve local discussions and consensus agreements between wildlife, agricultural, and development interests.
 - (3) Work groups should first look at maintaining and expanding populations on federal lands, and consider these areas as the core area for conservation. After identifying manageable level for these lands, work groups should work with Native American tribes on black-tailed prairie dog conservation on tribal lands. Because the largest amount of occupied prairie dog habitat presently occurs on these lands, maintaining and enhancing populations in these areas will contribute the greatest in the shortest amount of time toward the conservation of the species.
 - (4) Regardless of landownership patterns, when viewed across the prairie dog range, the prairie dog population numbers contained in each state plan must add up to a total that has been determined to be within a biologically defensible range. The total must be capable of sustaining itself and be stable enough to preclude the need for federal or state listing as a threatened or endangered species.
- F. Each work group will identify corrective measures that will be taken when the number of occupied acres falls below target levels and **include them in their state management plans**. Examples of corrective measures, depending on circumstances, could include: regulations or limits on shooting, restriction of control efforts, implementation of mechanisms to control the spread of disease, reestablishment of exterminated colonies and/or establishment of new colonies, and use of habitat

improvement techniques.

- G. Work groups will review state, federal, or tribal subsidies to control prairie dogs. Control subsidies should be used only when prairie dog populations are above the optimum management level and control is a desired and legal action. State or federal funding for prairie dog control should only be used as a management tool in conjunction with population levels in the state management plan.
 - H. Work groups will establish mechanisms to work with governmental, tribal and private land managers to assure the state's overall objectives for the optimum level of occupied acres are met.
4. Cooperation with Mexico, Canada, and Native American tribes.
- A. The BTPDCT will ensure that coordination with Mexico, Canada, and Native American tribes occurs within the framework of the annual meetings of the Trilateral Commission, which is comprised of the United States, Mexico, and Canada, Native American Wildlife Society meetings, and any other meetings.
 - B. Through the BTPDCT, a relationship will be fostered with Mexico, Canada, and Native American tribes that will hopefully encourage them to determine the present distribution and status of black-tailed prairie dogs and their habitats within their boundaries, and to identify possible refugia or conservation plans for them. As relevant information becomes available from Mexico, Canada, Native American tribes, and the BTPDCT it will be disseminated to all state work groups. When information is available from Mexico and Canada, the BTPDCT will generate a distribution map to assess the current, rangewide distribution for black-tailed prairie dogs.
5. Identify, maintain, and promote existing and other suitable prairie dog habitats.
- A. **By October 31, 2000** each state wildlife agency will coordinate with federal land management agencies, state land departments, participating tribes, and private landowners to conduct black-tailed prairie dog habitat inventories. This will include both unoccupied and occupied habitat. Work groups need to identify specific individuals responsible for inventory coordination within their particular land area. At a minimum, these inventories will identify areas that contain characteristics conducive to prairie dogs. GIS technology should be used while surveying and producing maps. More specific mapping resources are likely available for certain federal, state, and tribal properties.

On-the-ground habitat inventories, ground-truthing, or other on-the-ground studies conducted on private or tribal lands pursuant to this Conservation Agreement, shall not occur without prior permission from the landowner or tribe.

- B. By **March 31, 2001**, each work group will produce state-specific maps delineating land ownership patterns overlaid with suitable occupied and unoccupied black-tailed prairie dog habitat, insofar as such habitat can be delineated at that time. Private lands on such maps will not be identified as to individual owners, except upon written consent of the landowner. These maps will be a primary basis for evaluating constraints to, and opportunities for, prairie dog habitat management within each state. The BTPDCT will identify a central repository for national inventory information.
- C. Through the BTPDCT and state work groups, federal, state, tribal, and private land managers will be encouraged to conserve or enhance suitable or potentially suitable habitat, including corridors connecting these habitat blocks, to ensure that the black-tailed prairie dog's current and future habitat needs (including natural dispersal and habitat expansion) are appropriately addressed in the United States. In doing so, the cooperators will consider state, federal, tribal, and private cooperation, funding sources, and availability of suitable habitat.
- D. State agencies will pursue conservation and enhancement agreements for suitable prairie dog habitat with federal and state land managers and willing private landowners, where such protection will address conservation objectives for the species. Conservation agreements might include supporting federal and tribal agencies in reducing control efforts in important core areas or voluntary measures by private landowners. Condemnation shall not be used as a land protection mechanism. Examples of voluntary habitat agreements that may be developed are: State Stewardship Agreements; USFWS Partners for Wildlife Agreements; and conservation easements among private organizations and government agencies.

Efforts to design or implement habitat protection or other conservation measures for private lands under this Agreement or state management plan shall only occur in cooperation with willing landowner(s). Prioritization will be given to those landowners that have prairie dog colonies or complexes that are highly rated under the criteria discussed under Section 3B. Private property owners shall not be involuntarily subject to any such protection or enhancement agreement under this Agreement or state management plan.

- E. State work groups, in cooperation with the BTPDCT and the scientific advisory group, will monitor and identify new, continued, or diminishing threats to prairie dog habitat and population viability.
- F. Incentives for prairie dog conservation need to be identified and implemented whenever possible to promote private landowner participation. Work groups will investigate the following mechanisms for incentives:
 - (1) Establish a mechanism or process for landowners that desire to remove

prairie dogs emigrating from adjoining federal, state, private or tribal lands.

- (2) Direct payments from private funds (i.e. nongovernmental organizations, energy, natural gas, and railroad industries, and developers) that would maintain, enhance, and expand occupied prairie dog acres.
- (3) Reduced grazing fees for leases on state or tribal grazing lands that are occupied by prairie dogs.
- (4) Federal or state incentive programs, such as 2002 Farm Bill or the TPWD's Landowner Incentive Program, to provide incentives for maintaining viable prairie dog populations and habitat on private lands. Investigate other existing mechanisms to provide financial incentives when properties are evaluated for acceptance into government programs.
- (5) Use tools provided for in the Endangered Species Act or in policies of the Service to promote black-tailed prairie dog conservation. Examples are the Safe Harbor and Candidate Conservation Agreements (if this species becomes a candidate for federal listing).
- (6) Develop cooperative agreement strategies to promote black-tailed prairie dog conservation, such as MOUs and MOAs. Encourage participation in land use planning by tribal, state, county, municipalities, and federal entities for the purpose of promoting black-tailed prairie dog conservation.

An incentive is not necessarily a monetary incentive. For example, an assurance that a prairie dog complex will not be allowed to expand beyond certain boundaries or onto adjoining private land is important for securing landowner tolerance. In such cases, cooperating entities will establish programs and policies to avoid conflicts with adjoining landowners that do not wish to furnish habitat for black-tailed prairie dogs.

6. Public education.

- A. The BTPDCT will provide information, education, and technical assistance on black-tailed prairie dog conservation and management to Conservation Agreement partners in a timely fashion to include in their educational materials.
- B. Work groups will develop and distribute educational materials and implement projects that will help improve prairie dog conservation and management on public, private, and tribal lands. An educational component will be **included in the state management plans**. Materials and projects may include:
 - (1) Informational brochures targeting the general public and land managers.

These brochures will emphasize the need for prairie dog conservation and contain a description of the natural history of prairie dogs and a list of beneficial and detrimental management practices. Management discussions should mention practices that allow for livestock and prairie dogs to be managed incorporating nonlethal control of prairie dogs and the concepts of integrated pest management. Brochures will also recognize the potential detrimental impacts and benefits of black-tailed prairie dogs to private landowners and explain management needs and challenges within the state.

- (2) Fact sheets that explain the effects of plague on prairie dog colonies and possible transmission to humans.
- (3) State updates, or newsletters, to be distributed to public and private land managers within the state's prairie dog range. This update would keep land managers informed of conservation issues and new technology being developed for prairie dog conservation. It would also serve as an avenue for members of the work group to receive valuable input from all stakeholder groups.
- (4) Demonstration areas that would educate land managers on components of prairie dog habitat, how to manage for prairie dog habitat, and what other uses, such as livestock grazing, which can be integrated with prairie dog conservation.
- (5) Local newspaper, radio, and television stories, segments, or series that inform the public about the prairie dog conservation effort.

Educational materials emphasizing prairie dog conservation that could be incorporated into existing school curricula, including a teacher packet for use during visits to prairie dog towns and a video describing black-tailed prairie dog ecology, controversy, and activities.

- (6) A database that contains an annotated bibliography of historical and current information on prairie dogs.
- (7) An Internet website that provides prairie dog information. Members of the state work group will provide information to update the database and web page, and the pages should be linked to other state websites.
- (8) Watchable wildlife maps and associated materials directing the public to prairie dog viewing sites or areas closed to shooting.
- (9) Conducting landowner meetings to identify issues and concerns and seek constructive solutions to meet conservation objectives.

- C. Work groups will identify the recreational, educational, scientific, and economic benefits and concerns associated with prairie dogs. They will use this information when developing conservation guidelines and educational materials. Methods to collect this information may include:
- (1) A formal scientific survey of the public to identify their concerns/issues/needs, which can be addressed by conservation and management strategies.
 - (2) Literature and Internet searches.

Work groups will implement and promote projects that provide balanced information on the benefits and deterrents of prairie dogs.

7. Research Needs

Some of the research and information needs identified below may already be known, and completion of a thorough literature review will provide answers to some questions. In some cases, the information presented may only be speculation or altogether unknown, thus further research is necessary.

- A. With the assistance of scientific expert committee, the BTPDCT will ascertain how much is already known and prioritize information needs. This could **occur by October 31, 2000** in the form of a workshop or symposium.
- B. State work groups will prioritize research needs for their state and will **include them in their management plans**. Works groups need to consider both regional and rangewide needs. In developing state management plans, identified research projects might support the following needs:
- (1) Plague

Plague typically destroys all prairie dog colonies within a complex within a few years of its introduction into the complex (Knowles 1992). The more dense the complex, the more complete the mortality (Knowles 1995). Plague infected fleas can remain alive in prairie dog burrows for up to one year following the death of prairie dogs (Lechleitner et al. 1968). Thus prairie dog recolonization following an epizootic is slow, and at times, does not reach the same densities as before the plague event. Once established in an area, plague becomes persistent and periodically erupts, with the potential to extirpate local black-tailed prairie dog populations (Mulhern and Knowles 1995). Prairie dog colonies virtually eradicated by plague require approximately 4-5 years to regenerate and then again become susceptible to a plague epizootic (Cully 1989). Recovery from an epizootic may take as long as 10 years

(Knowles 1995).

Plague was first observed in Gunnison's prairie dogs in northwestern Arizona in 1932 (Eskey and Haas 1940). In 1946, plague was first observed in black-tailed prairie dogs in Texas (Cully 1989). The first plague epizootic in black-tailed prairie dogs in Kansas was verified on the Cimarron National Grassland in 1996 (USFWS 1999). Plague is believed to be the primary limiting factor in four of Montana's larger prairie dog complexes, and will likely spread to other complexes (Knowles 1992). Plague has not been documented in South Dakota black-tailed prairie dog populations. Plague work is underway regarding black-footed ferret reintroductions and BTPDCT needs to coordinate with this effort. Further research and information are needed on:

- a. The extent and cycle of plague throughout the black-tailed prairie dog range.
- b. The amount of time needed for a prairie dog complex to fully recover from plague and whether smaller complexes are more vulnerable.
- c. The mechanisms that allow some prairie dogs to survive an epizootic within a colony; whether some individuals have a level of resistance to the disease.
- d. The effect of colony size and spacing has on the severity of the spread of plague.
- e. Whether plague is more virulent in the southern or western portion of the black-tailed prairie dog range.
- f. The factors that have limited the spread of plague to areas and prairie dog colonies unaffected by the disease.
- g. The factors that allow plague to enter a prairie dog town, how plague affects the town and repopulation of the town.
- h. Whether periodic dusting of burrows with an insecticide is an effective means of plague control; and other potential methods of plague control.
- i. Methods to monitor and control plague efficiently and economically.

(2) Land Conversion/Loss of Habitat

Much of the Great Plains grassland habitat today exists as isolated blocks of

short and mixed grass prairie surrounded by cropland. The remaining areas of prairie have often been considerably altered for livestock production. Prairie dog colonies create patches of distinct habitat within the native grassland. Further research and information are needed on:

- a. The importance of prairie dog occupied habitat patches in maintaining local populations of associated species.
- b. Whether prairie dogs can be sustained in areas of repeated summer fallow or dry land cultivation.
- c. The degree to which black-tailed prairie dog populations are influenced by cattle and native grazing species.
- d. Whether habitat conditions can be altered to enhance reintroduction/translocation efforts once burrow systems have deteriorated.

(3) Grazing Competition

Prairie dogs can markedly modify the landscape. Their burrowing and foraging activities affect vegetation, soil, and water transport. Direct dietary overlap between prairie dogs and cattle may not necessarily limit forage availability for either group. Prairie dogs can indirectly compete with cattle by clipping vegetation without consuming it, resulting in a smaller quantity of forage available for livestock consumption. The remaining vegetation, however, often has a seasonally higher nutritional value than that on other areas. Drought and overgrazing may heighten competition for forage between the prairie dogs and livestock. These factors, however, also encourage expansion of prairie dog colonies into new areas. During wet years, competition between the cattle and prairie dogs may be reduced, and colony enlargement inhibited where dense vegetation acts as a barrier. Further research and information are needed on:

- a. Whether cattle and wild ungulates preferentially graze on prairie dog towns.
- b. Whether cattle grazing in pastures occupied by black-tailed prairie dogs gain as much weight as cattle grazing in similar pastures without prairie dogs.
- c. Whether black-tailed prairie dog foraging and burrowing activities reduce grass and increase forb and shrub abundance and if range conditions improve with prairie dogs present.

- d. Whether soil churning by prairie dogs increases plant diversity and nutrition, thereby benefiting cattle and other wildlife.
- e. Whether the more closely cropped vegetation within a prairie dog town is substantially more nutritious than adjacent rangeland.
- f. Determine the occurrence of livestock injuring themselves in prairie dog burrows.
- g. Determine if the potential benefits of increased nutritional value of the vegetation when prairie dogs are present offsets the potential losses to forage quantity and availability for livestock when prairie dogs are absent.

(4) Prairie Dog Control

The use of strychnine for prairie dog control during the 1920s and 1930s likely reduced prairie dog numbers 90% rangewide, but probably did not eradicate prairie dogs from extensive areas (Knowles 1992). Prairie dogs saw a period of recovery in the 1940s. But this recovery was soon reversed in the 1950s and 1960s when Compound 1080 provided land managers the means to eliminate prairie dogs from widespread areas (Knowles 1992). Presently, zinc phosphide, the only current EPA registered bait for prairie dog control, is only about 90% effective in controlling prairie dogs (Knowles 1992). Gas cartridges and aluminum phosphide are also registered for prairie dog control. Further information is needed on:

- a. Whether prairie dogs are capable of population recovery following extensive control efforts.
- b. Determine the effect of prairie dog poisoning on non-target species.
- c. Determine the effective level of control for reducing potential competition with livestock.
- d. Whether nonlethal control measures are as effective as lethal methods.
- e. Determine the amount of time or minimal colony size needed for a prairie dog complex to recover following control efforts.

(5) Recreational Shooting

Recreational shooting has become quite popular in recent years. The exact

effect of recreational shooting on the various components of a prairie dog town, in both small and large complexes, has yet to be determined. In large, healthy black-tailed prairie dog populations, recreational shooting impacts may be compensatory to natural mortality, and therefore not a predominant limiting factor (USFWS 1999). Mortality from recreational shooting in small local populations, however, may be additive (USFWS 1999). Recreational shooting may also contribute to population fragmentation and slow or deter recovery of colonies reduced by other factors such as plague. Further research and information are needed to:

- a. Determine the degree of shooting pressure on prairie dogs that will force them to spend a greater proportion of time in alert postures and less time foraging.
- b. Determine the effect of colony population dynamics and colony maintenance by having prairie dogs spending more time in alert positions.
- c. Whether there is a minimum threshold of prairie dogs required to keep vegetation clipped and to watch for predators, and if shooting reduces the prairie dog colony population below that threshold.
- d. Whether intensive shooting has a statistically significant impact on the density and composition of local prairie dog colonies and social structure and interactions.
- e. Determine the effects of shooting on other non-target wildlife.
- f. Whether extensive shooting, especially of pregnant or nursing females, significantly reduces annual recruitment and the ultimate population dynamics of a colony.

(6) Population Viability Analysis

Larger prairie dog colonies are likely more resistant to various population limiting factors. Smaller colonies, however, may be more susceptible to factors affecting isolated populations (e.g. stochastic events and inbreeding), in addition to the major factors that continue to suppress all prairie dog colonies (e.g. plague, poisoning, habitat loss). More fragmented, isolated and less connected populations usually have higher extinction rates. Further research and information are needed to determine:

- a. Whether smaller isolated prairie dog towns have higher extinction rates than larger towns within complexes.

- b. Whether isolated prairie dog colonies result in the loss of additional genotypes.
- c. The minimum viable population.
- d. The degree of colony interconnectivity and maximum dispersal capabilities.
- e. The genetic integrity of the species.
- f. Relationship between colony size, isolation and spread of plague.

(7) Prairie Dog Associated Species/Shortgrass Prairie Keystone Species

The black-tailed prairie dog has been described as a keystone species of the shortgrass prairie, suggesting the species influences ecosystem functions through their activities in unique and significant ways (USFWS 1999). If true, then the estimated 99% decline of occupied black-tailed prairie dog habitat in the Great Plains should have initiated changes in ecosystem structure resulting in a decline of overall species diversity.

Black-tailed prairie dog-associated species can be categorized as prey dependent or habitat dependent, and obligatory or facultative. Although the vast majority of associated species are not dependent upon prairie dogs for their survival (facultative), it has been implied that many species of birds and small mammals occur at higher densities on prairie dog colonies than adjacent areas without colonies (Miller et al. 1994). For prey dependent species, prairie dog colonies represent patches of dense prey availability. For habitat dependent species, colonies represent patches of low growing vegetation that are high in nitrogen and low in stem content. Prairie dog colonies increase areas of bare ground and provide burrows for shelter.

The black-footed ferret is probably the only truly obligatory predator of prairie dogs (Knowles 1992). The swift fox and ferruginous hawk are considered to be generalized prairie dog predators. The mountain plover and burrowing owl are believed to be prairie dog habitat dependent species. In Montana, the mountain plover has been suggested as on the verge of being an obligatory habitat species with black-tailed prairie dogs (Knowles 1992). Also in Montana, the decline of the ferruginous hawk has been associated with the decline of prairie dogs (Knowles 1992). Current information suggests, however that the swift fox's status is unrelated to prairie dogs. The burrowing owl is closely associated with prairie dogs, primarily because of

the availability of nest burrows. Burrowing owls, however, do not normally feed on prairie dog towns, and the geographic range of this species is much greater than that of all prairie dog species combined. Further research and information are needed to determine:

- a. Whether the estimated decline of occupied black-tailed prairie dog habitat in the Great Plains has initiated changes in ecosystem structure resulting in a decline of overall species diversity.
- b. Other prairie dog obligate species besides the black-footed ferret.
- c. Whether habitat associated species occur in higher densities on towns as opposed to on suitable habitat without prairie dog towns.
- d. Whether suspected prey- and habitat-associated species abundance are linked to prairie dog towns throughout the entire prairie dog range or only in localized areas and situations.
- e. Ideal prairie dog complex size including town size and proximity for obligate species.

(8) Commercial use of prairie dogs

A more recent impact on prairie dogs is the commercial exploitation in the pet trade. Animals are sold in foreign markets for as high as \$700 a pair. Further research and information are needed to determine:

- a. The amount of commercial trade that is occurring within each state.
- b. The effects of commercial take methods on non-target species.

8. State regulatory review.

In some states, prairie dog management authority rests with both the state/tribal wildlife and agricultural agency. Local governments, state, federal, and tribal agencies need to consult with each other regarding actions that result in take. The state wildlife agencies will take the lead in establishing a process of communication with entities regarding management to ensure black-tailed prairie dog population viability. By **August 15, 2001**, state work groups will investigate, evaluate, determine the feasibility, and if necessary, change state regulations to clarify regulatory authority and mandates for prairie dog management. Statutes that mandate control will either be eliminated or modified such that they do not restrict protection efforts should they become necessary.

- A. Recreational Shooting-Prairie dog management should include biologically based shooting seasons and methods to estimate hunter effort and harvest. By **August 15, 2000**, state wildlife agencies need to investigate, evaluate, and if necessary and

possible, change state hunting regulations to conserve or enhance prairie dog populations. As with other harvested species, states should develop mechanisms to direct effort away from areas where prairie dogs are depleted or where other grassland species could be impacted.

- B. **Control**-Work groups will review federal, state, and tribal policies directed at control and develop a management scheme to guide control activities. Guidelines **will be included in state management plans**. Mandatory control and eradication will be investigated, evaluated, and if necessary and possible, state regulations will be modified to ensure the species viability within an area. Control activities will include lethal and nonlethal methods.
 - C. **Commercial use**-Work groups will review both federal and state policies directed at commercialization of prairie dogs and develop a management scheme to guide commercial activities. Guidelines **will be included in state management plans**.
9. Evaluation of progress and accomplishments.
- A. By the end of January of each year, following execution of the Conservation Agreement, the BTPDCT will issue a written report on activities implemented to date to conserve the black-tailed prairie dog. The report will be submitted to the Service, and made available to all interested parties. Within 60 calendar-days of receipt of each report, the Service will inform the states in writing of any areas in which progress is not sufficient to warrant continuation of this Agreement. If such deficiencies are identified, within 90 calendar-days of notification the states will jointly determine whether to implement mutually acceptable, and agreed to by all parties to the Agreement, curative measures.

LITERATURE CITED

- Anderson, S. 1972. Mammals of Chihuahua. Bull. Amer. Mus. Nat. Hist. 148:151-410.
- Alexander, A.M. 1932. Control, not extermination of *Cynomys ludovicianus arizonensis*. J. Mammals. 13(2):302.
- Apa, A.D., D.W. Uresk, and R.L. Linder. 1990. Black-tailed prairie dog populations one year after treatment with rodenticides. Great Basin Nat. 50:107-113.
- Arizona Department of Health Services. 1995. Plague surveillance. Bacterial Zoonoses Branch, Division of Vector-Borne Infectious Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention. 5(1):1-21.
- Arizona Game and Fish Department. 1988. Threatened native wildlife in Arizona. Arizona Game and Fish Department Publication, Phoenix, Arizona. 32 pp.
- Bailey, V. 1905. Biological survey of Texas. N. Amer. Fauna. U.S. Dept. of Ag. Washington, D.C. 25:89-92.
- Bailey, V. 1932. Mammals of New Mexico. N. Amer. Fauna 53:119-131.
- Baird, S.F. 1859. Mammals of the boundary. U. S. Boundary Survey under order of Lieut. Col. W. H. Emory, Vol. 2, pt. 2, 62 pp.
- Bell, W.R. 1921. Death to the rodents. U.S. Dept. of Ag. Yearbook. 1920:421-438.
- Bishop, N.G. and J.L. Culbertson. 1976. Decline of prairie dog towns in southwestern North Dakota. J. of Range Manage. 29(3):217-220.
- Bissell, S.J., J.R. Torres, R. Mellot, D. Lovell, and C. Loeffler. 1979. Endangered wildlife investigations, black-footed ferret verification and habitat inventory. Pittman-Robertson Progress Report SE-3-2. 18 p.
- Bodenchuk, M.J. 1981. New Mexico prairie dog survey, prairie dog management. Unpubl. report, New Mexico Department of Agriculture, Division of Agricultural Programs and Resources, 8 pp.
- Caire, W., J.D. Tyler, B.P. Glass, and M.A. Mares. 1989. Mammals of Oklahoma. University of Oklahoma Press, Norman. 567 pp.
- Campbell, T.M. III. 1989. Prairie dog colony location surveys and black-footed ferret searches in Montana. In The prairie dog ecosystem: Managing for biological diversity. Pp. 1-12. Montana BLM Wildl. Tech. Bull. No. 2. 55 pp.

- Campbell, T.M. and T.W. Clark. 1981. Colony characteristics and vertebrate associates of white-tailed and black-tailed prairie dogs in Wyoming. *Amer. Mid. Nat.* 105:269-276.
- Cary, M. 1911. A biological survey of Colorado. *N. Amer. Fauna*, 33:1-256.
- Ceballos, G., E. Mellink, and L.R. Hanebury. 1993a. Distribution and conservation status of prairie dogs *Cynomys mexicanus* and *Cynomys ludovicianus* in Mexico. *Biol. Cons.* 63:105-112.
- Cheatheam, L.K. 1977. Density and distribution of the black-tailed prairie dog in Texas. *Texas J. Sci.* 24 (1&2):33-40.
- Chesser, R.K. 1981. Genetic and morphological variation within and among populations of the black-tailed prairie dog. Unpubl. Ph.D. thesis, University of Oklahoma, 90 pp.
- Choate, J.R., E.K. Boggess, and F.R. Henderson. 1982. History and status of the black-footed ferret in Kansas. *Trans. Kansas Acad. Sci.* 85:121-132.
- Cockrum, E.L. 1960. The recent mammals of Arizona: their taxonomy and distribution. The University of Arizona Press, Tucson. 276 pp.
- Conover, M.R. and D.J. Decker. 1991. Wildlife damage to crops: perceptions of agricultural and wildlife professionals in 1957 and 1987. *Wildl. Soc. Bull.* 19(1) 46-52.
- Cully, J.F., Jr. 1993. Plague in prairie dog ecosystems: importance for black-footed ferret management. In the prairie dog ecosystem, managing for biological diversity. Montana BLM Wild. Tech. Bull. No. 2. Pp. 47-55.
- FaunaWest Wildlife Consultants. 1999. Status of the black and white-tailed prairie dogs in Montana. Helena: Montana Fish, Wildlife and Parks. 33 pp.
- Findley, J.S., A.H. Harris, D.E. Wilson, and C. Jones. 1975. The mammals of New Mexico. University of New Mexico Press, Albuquerque, xxii + 360 pp.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. University Press of Colorado, Niwot.
- Flath, D.L. and T.W. Clark. 1986. Historic status of black-footed ferret habitat in Montana. *Great Basin Nat. Mem.* 8:63-71.
- Foster, N.S. and S.E. Hygnstrom. 1990. Prairie dogs and their ecosystem. University of Nebraska, Lincoln. Dept. of Forestry, Fisheries and Wildlife. 8 pp.

- Fox, M. and C. Knowles. 1995. Economic and ecological evaluation of the fort Belknap Indian Reservation fish and wildlife program. Poster presentation at Montana Chapter of The Wildlife Society, 31 January-1 February, 1995, Billings, Montana as cited in Mulhern and Knowles.
- Hall, E.R. 1981. The Mammals of North America. Vols. 1 and 2. John Wiley and Sons, New York, 1,181 pp.
- Hansen, D.J. 1977. Taxonomic status of the prairie dog *subspecies Cynomys ludovicianus ludovicianus* (Ord.) and *Cynomys ludovicianus arizonensis* Mearns. M.S. Thesis, Eastern New Mexico University, 32 pp.
- Hansen, R.M. 1988. Chronology of prairie dog control operations and related developments in South Dakota. Pages 121-122 in Eighth Great Plains Animal Damage Control Workshop, Rapid City, SD. USDA Forest Service General Tech. Rept. RM-154, D.W. Uresk, G.L. Schenbeck, and R. Cefkin, eds.
- Henderson, F.R. and R.J. Little. 1973. Status of the black-footed ferret and black-tailed prairie dog in Kansas. In Proc. Black-footed Ferret and Prairie Dog workshop. South Dakota State University, Brookings. pp. 34-40.
- Hoffmeister, D.F. 1986. Mammals of Arizona. Arizona Game and Fish Department and University of Arizona Press, Tucson. 276 pp.
- Hollister, N. 1916. A systematic account of the prairie dogs. N. Amer. Fauna, 40:1-256.
- Hoogland, J.L. 1995. The black-tailed prairie dog: social life of a burrowing mammal. University of Chicago Press, Chicago, Illinois. 557 pp.
- Hubbard, J.P. and C.G. Schmitt. 1984. The black-footed ferret in New Mexico. New Mexico Department of Game and Fish, Unpubl. report to New Mexico Bureau of Land Management, Santa Fe, New Mexico, 118 pp.
- Jones, C. and C.G. Schmitt. 1997. Mammal species of concern in New Mexico. Pages 179-205 in. T.L. Yates, W.L. Gannon & D.E. Wilson, eds. Life Among the Muses: Papers in Honor of James S. Findley. The Museum of Southwestern Biology, The University of New Mexico. 290 pp.
- Jones, J.K., Jr. 1964. Distribution and Taxonomy of Mammals of Nebraska. University of Kansas, Lawrence, 356 pp.
- Knowles, C.J. 1995. A summary of black-tailed prairie dog abundance and distribution on the central and northern Great Plains. Prepared for the Defenders of Wildlife, Missoula,

- Montana. 65 pp.
- Knowles, C.J. and P.R. Knowles. 1994. A review of black-tailed prairie dog literature in relation to rangelands administered by the Custer National Forest. USDA, Forest Service. 61 pp.
- Knowles, C. 1998. Availability of black-tailed prairie dog habitat for black-footed ferret recovery. Unpubl. final report to U.S. Fish and Wildlife Service. 13p.
- Koford, C.B. 1958. Prairie dogs, whitefaces and blue gramma. Wildl. Monogr. 3, 78 pp.
- Laing, R. 1986. The feasibility of re-introducing the black-footed ferret to the Canadian prairie. MS Thesis. University of Calgary, Alberta. 134 pp.
- Lair, P. and J. Mecham. 1991. Black-footed ferret restoration evaluation/prairie dog status. Federal Aid Report. Job No. 70, Aug. 31, 1991.
- Lantz, D.E. 1903. Destroying prairie dogs and pocket gophers. Kansas State Exp. Sta. Bull. 116:147-163.
- Laurenroth, W.K. 1979. Grassland primary production: North American grasslands in perspective. Pp. 3-24 *in* Perspectives in grassland ecology (N.R. French, ed.). Springer-Verlag, New York.
- Lechleitner, R.R., R.L. Kartman, M.I. Goldenberg, and B.W. Hudson. 1968. An epizootic plague in Gunnison's prairie dogs (*Cynomys gunnisoni*) in south-central Colorado. *Ecology* 49:734-743.
- Lechleitner, R.R. 1969. Wild mammals of Colorado: their appearance, habits, distribution, and abundance. Pruett Publishing Co, Boulder.
- Lee, C.D. and F.R. Henderson. 1989. Prairie dog populations in Kansas. Unpublished Kansas St. Univ. Ext. Animal Sci. Ret., Manhattan. 27pp.
- Lee, C.D. and F.R. Henderson. 1989. Kansas attitudes in prairie dog control. Ninth Great Plains Wildlife Damage Control Workshop, Fort Collins, Colorado, April 18-20, 1989.
- Lewis, J.C. and F.D. Hassien. 1974. Status of prairie dogs and black-footed ferret in Oklahoma. *Proc. Oklahoma Acad. Sci.* 54:20-24.
- Matchett, R. 1997. Annual report of black-footed ferret recovery activities, UL Bend and Charles M. Russel National Wildlife Refuges, Southern Phillips County, Montana. 91 pp.
- Meade, C.H. 1898. Some natural history notes of 1859. *Transcript of Kansas Acad. Sci.* 16:280-281.
- Mead, J.R. 1899. Some natural-history notes of 1859. *Tran. Kansas Acad. Sci.* 16:280-281.

- Mearns, E.A. 1907. Mammals of the Mexican boundary of the United States. Part I. U. S. Nat. Mus. Bull. 56, 530 pp.
- Merriam, C.H. 1901. The prairie dogs of the Great Plains. Yearbook of the U. S. Dept. of Agriculture for 1901, Washington, D. C., pp. 257-271.
- Miller, B., G. Ceballos, and R.P. Reading. 1994. The prairie dog and biotic diversity. Cons. Biol. 8(3):677-681.
- Millson, R. 1976. The black-footed ferret in the proposed Grasslands National Park. MS Thesis. University of Calgary, Alberta. 107 pp.
- Mulhern, D.W. and C.J. Knowles. 1995. Black-tailed prairie dog status and future conservation planning. In Conservation biodiversity on native rangelands. Symp. Proceedings. August 17, 1995.
- State of New Mexico. 1978 (1988 Repl.). New Mexico Statutes 1978 Annotated, Chapter 17, 17-1-1 to 17-7-3, Game and Fish, Pamphlet 33, 1-67 pp.
- State of New Mexico. 1978. New Mexico Statutes 1978 Annotated, Chapter 77, 77-15-1 to 77-5-14, Animals and Animal Industry.
- Oakleaf, B., A. O. Cerovski, and B. Luce. 1996. Nongame Bird and Mammal Plan. Wyoming Game and Fish Department, Cheyenne. 183 pp.
- Paternoster, T.M. 1997. A survey of active black-tailed prairie dog (*Cynomys ludovicianus*) colonies in Curry and Roosevelt counties, NM. New Mexico Department of Game and Fish, Santa Fe, New Mexico, Contract 97-516.86, Unpubl. report, 16 pp.
- Perry, B. 1998. U.S. Dept. of Agriculture. Forest Service. Personal communication.
- Pizzimenti, J.J. 1975. Evolution of the prairie dog genus *Cynomys*. Occ. Papers, Mus. Nat. Hist. Univ. Kansas 39:1-73.
- Powell, K.L. 1992. Prairie dog distribution, habitat characteristics, and population monitoring in Kansas: implications for black-footed ferret recovery. M.S. Thesis. Kansas State Univ., Manhattan. 131pp.
- Reichenbach, R. 1999. Wyoming Dept. of Agriculture. Personal communication.
- Sager, L. 1996. A 1996 survey of black-tailed prairie dogs (*Cynomys ludovicianus*) in northeastern New Mexico. New Mexico Department of Game and Fish, Santa Fe, New Mexico, Contract 96-516.61, Unpubl. report, 44 pp.

- Seton, E.T. 1953 (reprint from 1929). Lives of game animals, volume IV- part I Rodents, etc. Charles T. Branford Company, Boston. Pp. 275-298.
- Shackford, J.S. 1989. A survey of the black-tailed prairie dog in Oklahoma. Oklahoma Dept. of Wildl. Conserv. 17 pp.
- Smith, R.E. 1958. Natural history of the prairie dog in Kansas. Museum of Natural History and State Biol. Survey of Kansas. Misc. Pub. No. 16. University of Kansas. 36 pp.
- South Dakota Department of Agriculture, in cooperation with SDGFP, USDA-ADC, USFWS, Coop. Extension Service, and USDA-SCS. No date. Prairie dog management in South Dakota.
- South Dakota Department of Game, Fish and Parks, Wildlife Division. 1994. Systematic Approach to Management. Other Game Mammals Strategic Plan.
- South Dakota Department of Game, Fish and Parks. 1996. Results of prairie dog survey questionnaire. Wildlife Division Rept. No. 96-09.
- State of New Mexico. 1978 (1988 Repl.). New Mexico Statutes 1978 Annotated, Chapter 17, 17-1-1 to 17-7-3, Game and Fish, Pamphlet 33, 1-67 pp.
- State of New Mexico. 1978. New Mexico Statutes 1978 Annotated, Chapter 77, 77-15-1 to 77-5-14, Animals and Animal Industry.
- Truett, J.C. and T. Savage. 1998. Reintroducing prairie dogs into desert grasslands. Restoration and Management Notes 16(2):189-195.
- Tschetter, B.J. 1988. Estimates of South Dakota prairie dog acreages, 1987. SD Game, Fish and Parks Department, Wildlife Division Rept. 88-01.
- Tyler, J.D. 1968. Distribution and vertebrate associations of the black-tailed prairie dog in Oklahoma. Ph.D. Dissertation., Univ. of Oklahoma, Norman. 85 pp.
- USDA-Forest Service. 1988. Black-tailed prairie dog management for the Nebraska National Forest, Samuel R. McKelvie National Forest, Oglala National Grassland, Buffalo Gap National Grassland, and Fort Pierre National Grassland.
- U.S. Fish and Wildlife Service. 1999. Positive 90-day finding for a petition to list the Black-tailed prairie dog. Unpubl. Report. 50 pp.
- Vanderhoof, J.L. and R.J. Robel. 1994. Numbers and extent of Black-tailed prairie dog towns in

- Kansas. Trans. Kansas Acad. Sci. 97:36-43.
- Van Pelt, W.E. and D.W. Belitsky. 1995. Black-tailed prairie dog: assessment of potential habitat and associated mammals of high interest on Fort Huachuca, Cochise County, Arizona. Arizona Game and Fish Department Final Report. 21 pp.
- Weber, W. and A. Rabinowitz. 1996. A global perspective on large carnivore conservation. *Conservation Biology* 10(4):1046-1054.
- Whipple, A.W. 1956. Report of explorations for a railroad route, near the thirty-fifth parallel of north latitude, from the Mississippi River to the Pacific Ocean. Part 1., U. S. Congress 33, 3rd Session, Ex. Doc. 91, 136 pp.
- Woodhouse, S.W. 1853. Zoology. *In* Report on the natural history of the country passed over by the exploring expedition under the command of Brev. Captain L. Sitgreaves, U. S. Topographical Engineers, during the year 1851. U. S. Congress 33, 1st Session, Senate Ex. Pro. Washington, D. C.